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WAR DEPARTMENT

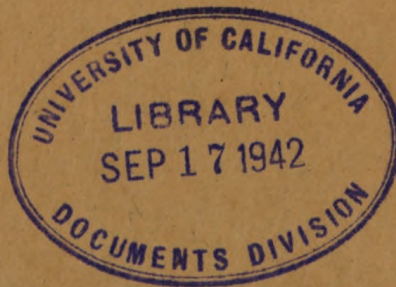
U.S. Dept. of Army

TECHNICAL MANUAL



ABBREVIATED FIRING TABLES

December 15, 1941



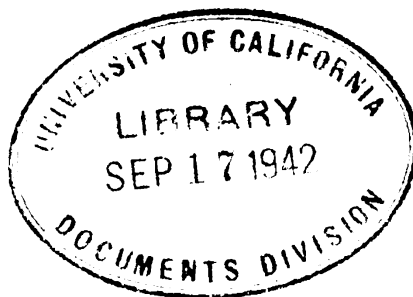


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**ABBREVIATED FIRING TABLES**

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No. 6-215



WAR DEPARTMENT,  
WASHINGTON, December 15, 1941.

## ABBREVIATED FIRING TABLES

Prepared under direction of the  
Chief of Field Artillery

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### SECTION I

#### GENERAL

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**1. General.**—Firing tables contain data, pertinent to the application of fire, based on standard trajectories for each type of weapon and combination of projectile, fuze, and propelling charge. A standard trajectory is the one theoretically existing under known, arbitrarily selected conditions of weather, position, and matériel. The amount of important variance that may be expected in a trajectory fired under conditions differing from standard may be computed from the values listed in the tables.

**2. Scope.**—The tables contained herein are extracts from Firing Tables 75-B-4 for the 75-mm gun M1897 (and modifications), and from Firing Tables 155-D-2 for the 155-mm howitzer M1917, M1917A1, M1918, and M1918A1. Of the various combinations of projectile, fuze, and charge available for these weapons, there have

\*This manual supersedes TM 6-215, November 27, 1940, and Training Circular No. 22, War Department, 1941.

been included herein three combinations for the 75-mm gun and four combinations for the 155-mm howitzer.

**3. Purpose.**—The purpose of this manual is to present information and instruction regarding firing tables. For the 75-mm gun, the manual includes sufficient data for the solution of problems involving selection and application of the appropriate combination of projectile and fuze for various missions; for the 155-mm howitzer, sufficient data to enable the student to select and apply the appropriate combination of fuze and charge for HE shell, within the usual ranges for division artillery.

**4. Arrangement.**—*a.* Section I contains an explanation of the tables and instructions for their use.

*b.* Section II contains data applicable to any combination of projectile, charge, and fuze. In it are found—

(1) Conversion factors.

(2) Natural trigonometric functions of angles in mils.

(3) *s* and *d* tables.

(4) Wind-components table.

(5) Tables and formulas for reducing temperature and density at the altitude of the meteorological datum plane to those at the altitude of the battery.

(6) Conversion table, degrees and minutes to mils.

*c.* Section III contains tables for the 75-mm gun. It is divided into three parts: one part contains data for shrapnel, Mk. I; the other two, data for HE shell, Mk. I, point detonating fuzes M46 and M47, reduced charge and normal charge, respectively. Each part contains three tables: A, B, and C.

(1) Table A contains information as to certain elements of a standard trajectory, range and deflection effects of differences from standard, and correction for the angle of site.

(2) Table B gives the change in muzzle velocity due to variations in the temperature of the powder.

(3) Table C gives the deflection effect for cant of axle. (The correction for this effect is not necessary for weapons equipped with sights having cross-leveling bubbles.)

*d.* Section IV contains tables for the 155-mm howitzer. It is divided into four parts containing data for HE shell, Mk. I, point detonating fuzes M46 and M47, charges 3, 4, 5, and 6, respectively. Each part consists of three tables: A, B, and C, containing data as explained in *c*(1), (2), and (3) above.

**5. Explanation of tables.**—The tables in section II are self-explanatory. The tables of sections III and IV are explained below.

*a. Table A.*—This explanation is based upon table A for the 75-mm gun firing HE shell, Mk. I, normal charge, fuzes M46 and M47. An explanation of the variations between this table and the table for other combinations of projectile, fuze, and charge is given in *d* below.

(1) *Column 1.*—The *range* in yards for each hundred yards. The range given in these tables is regarded as measured along the surface of a sphere concentric with the earth and passing through the muzzle of the piece. For practical purposes, the range may be considered as measured along a horizontal plane passing through the piece. All effects, throughout a computation, are based on this range (to the nearest hundred yards). The determination of one effect is not based upon a range corrected for another effect. For example, the map range being 4,123, a range of 4,100 would be used throughout the computation as an argument in entering the tables, although the elevation for the map range, 4,123, would be determined to the nearest mil, by interpolation. The algebraic sum of all range corrections is converted to mils of elevation and applied to this map-range elevation, as is the site.

(2) *Column 2.*—The *elevation* in mils for the range shown in column 1.

(3) *Column 3.*—The *fork* in mils of elevation. (The fork is the change in elevation for four-probable-errors change in range.)

(4) *Column 4.*—The *change in elevation* for a 100-yard change in range. (This is *c*. It applies to ranges within 50 yards of the tabulated range.)

(5) *Column 5.*—The *change in range* for a 1-mil change in elevation. (Often referred to as "yards per mil." Applies to ranges within 50 yards of tabulated range.)

(6) *Column 6.*—The *time of flight* to the level point.

(7) *Column 7.*—The *probable error in range*. (The symbol for range probable error is  $e_{pr}$ .)

(8) *Column 8.*—The *probable error in deflection*. (The symbol for deflection probable error is  $e_{pd}$ .)

(9) *Column 9.*—The *slope of fall* (the tangent of the angle of fall), expressed as  $1/a$ , where 1 is the vertical distance and  $a$  is the horizontal distance.

(10) *Column 10.*—The *line number of metro message*. This is the initial digit of that seven-figure group which is to be used for the particular range. The seven-figure group on this line contains those data appropriate for the maximum ordinate of the range considered. The maximum ordinate is not given in table A. Its value in feet may be approximated by squaring the time of flight and multiplying by four. A condensed table of maximum ordinates is given in appendix I.

(11) *Column 11.*—The *deflection effect of drift*. The effect given in these tables includes side jump. Drift proper is always to the right, but the included left side-jump effect exceeds the drift effect in the shorter ranges. (Although a standard trajectory has drift, for convenience drift is considered a deflection effect.)

(12) *Column 12.*—The *deflection effect of a cross wind* of 1 mile per hour. The direction of the effect is given in the wind-components table. A wind from the right causes a *left effect*; a wind from the left, a *right effect*. (See wind-components table and description of metro message.)

(13) *Columns 12 and 15 to 19, inclusive.*—In columns 12 and 15 to 19 are given the *effects of a unit increase* above standard in matériel and weather conditions. Range effects of a unit decrease below standard in matériel and weather conditions are equal in value but opposite in sign to the effects shown in the table. A condition causing the trajectory to have greater range than standard has a *plus* range effect; one causing the trajectory to fall shorter than standard has a *minus* range effect. A condition causing the trajectory to fall to the right of a standard trajectory has a *right* deflection effect; one causing it to fall to the left, a *left* deflection effect. The range, usually measured from a map or firing chart, is one of the known values or arguments used in determining these effects. It is taken to the nearest 100 yards.

(14) *Columns 13 and 14.*—The *correction* which must be applied to each mil of computed angle of site to compensate for the non-rigidity of the trajectory. It is given to the nearest hundredth of a mil.

(15) *Column 15.*—The range effect of an increase of one cross (or square) above standard in weight of projectile. (See table of projectile weights.) For example, a 75-mm HE shell of weight "4 crosses" is two crosses above standard (2), giving an effect twice as great as the unit effect shown in the table and of the same sign; a 155-mm HE shell of weight "1 square" is three squares below standard (4), giving an effect three times as great as the unit effect shown in the table and of opposite sign.

(16) *Column 16.*—The range effect of an increase of muzzle velocity of 1 foot per second above standard. The sign of the effect is the same as the sign of the variation. (See table B.)

(17) *Column 17.*—The range effect of an increase in air temperature of 1° above standard (59° F.).

(18) *Column 18.*—The range effect of a rear wind of 1 mile per hour. The sign of the effect is the same as that of the range component.



(19) *Column 19.*—The range effect of an increase in air density of 1 percent above standard (100%).

(20) *Column 20.*—The *range setting* to be placed on the range scale of a piece firing from the M1897 carriage (and the modifications thereof) in order to reach the range given in column 1.

(21) *Column 21.*—The *range setting* similarly required when firing from the M2 carriage.

(22) *Column 1.*—*Range.* Same as in column 1 on left side; repeated for convenience.

*b. Table B.*—This table gives the change in muzzle velocity due to variation in the powder temperature. Whenever possible the actual temperature of the powder should be taken. With fixed ammunition the temperature of the place where the ammunition is stored at the battery is used. If the temperature cannot be taken at the battery, the air temperature given in the metro message, corrected for the altitude of the battery position, is used as a guide. With the effect obtained from this table, the column headed "Range effect of increase of—One foot per second in MV" in table A is entered to obtain the final effect in range.

*c. Table C.*—This table gives the deflection effect of 10-mils cant of the carriage axle. The effect of any other amount is proportional. The correction is applied to individual pieces by the executive.

*d. Variations in tables.*—Tables B and tables C are similar in form for all combinations of projectile, fuze, and charge. Variations in tables A from the arrangement described in *a* above are described below.

(1) *75-mm gun firing shrapnel, Mk. I, 21-second combination fuze.*—Table A contains four additional columns showing—

(a) *Column 9.*—The *probable error in height of burst*, expressed in mils.

(b) *Column 21.*—The *fuze setting*, in seconds, to produce a graze burst.

(c) *Columns 22 and 23.*—The *displacement of the burst* resulting from a change of five points in the corrector.

(d) No column of data is given for effect of weight of projectile.

(2) *155-mm howitzer, firing HE shell, Mk. I, fuzes M46 and M47.*—Separate tables are required for each of the seven charges of propelling powder used with this matériel. The tables are the same as those described in *a* above except that columns 20 and 21 (range settings) do not apply and are therefore omitted.

**6. The metro message.**—*a.* The metro message is a coded tabulation of meteorological conditions, on the surface of the earth and at varying zones above it, for use by the Field Artillery in applying these meteorological effects to its firing data. It consists of a group of three letters to designate the sending station, followed by one five-figure group and a series of seven-figure groups, as explained by the table which follows. If the first figure of the five-figure group is 2, the message applies to antiaircraft or other high-angle fire; if the first figure is 3, the message applies to Field Artillery.

*b.*

(1)	(2)				
Example of metro message	Explanation				
MIFMIF	The letter M indicates a metro message; the letters IF are the code designation of the sending station. (The group is usually repeated as indicated.)				
31256	The figure 3 indicates a metro message for the Field Artillery; 12 indicates that the MDP (meteorological datum plane) is 1,200 feet above sea level; 56 indicates that the temperature at the MDP is 56° F.				
	(3)	(4)	(5)	(6)	(7)
	Zones in height (feet)	Line of metro message	Azimuth of wind (mils)	Velocity of wind (m/h)	Density (percent)
0320802	Surface-----	0	3,200	8	102
1351101	Surface to 600-----	1	3,500	11	101
2371499	600 to 1,500-----	2	3,700	14	99
3401598	1,500 to 3,000-----	3	4,000	15	98
4441697	3,000 to 4,500-----	4	4,400	16	97
5481896	4,500 to 6,000-----	5	4,800	18	96
6502195	6,000 to 9,000-----	6	5,000	21	95
7532295	9,000 to 12,000-----	7	5,300	22	95
8562495	12,000 to 15,000-----	8	5,600	24	95
9622795	15,000 to 18,000-----	9	6,200	27	95

\*

The tabulation above explains the seven-figure groups.

The first figure of each group gives the line number of the metro message, column (4). (Also see column 10, table A.)

The second and third figures, explained in column (5), give the azimuth of the direction from which the ballistic wind blows, measured

\*Each additional line refers to an additional 6,000-foot zone in height.

clockwise from the true North, in hundreds of mils. In computations this is usually assumed to be the same as Y-North.

The fourth and fifth figures give the velocity of the ballistic wind, column (6).

The sixth and seventh figures, explained in column (7), give the ballistic density in percentage of standard. If greater than standard the first digit does not appear in the metro message; for example, 02 would mean 102, or an increase of 2 percent above normal, while 98 means a decrease of 2 percent below normal. This density must be corrected for the difference in altitude between the battery and MDP by means of the table for correcting density (page 17). The density is the mean effective density for the whole layer of atmosphere having a thickness equal to the height given.

c. Further explanation of the use of the metro message appears in paragraph 7.

**7. Computation of metro corrections; type problem.—a. General procedure.**—To compute metro corrections quickly and reliably it is necessary to follow a procedure that is systematic and orderly. Much of the work (such as determining the uncorrected direction and quadrant elevation, ascertaining from the battery executive the weight of projectile and temperature of powder, and listing all effects due to matériel) can usually be done in advance, leaving only a few simple, planned operations to be performed upon receipt of the metro message. The tables are so arranged as to facilitate this. Note that for a given target nearly all matter to be extracted from the tables appears on a single line, namely that line of table A which is identified by the map range (to nearest 100 yards).

**b. Example.**—For the 75-mm gun M2 firing HE shell Mk. I, normal charge, fuze M46, to determine the corrections in *direction* and *range* for a single check point:

(1) Record map data from firing chart (map, wide angle photo, or grid sheet):

Map range (to nearest 10 yards)	=4,780 yards
Altitude of check point (target)	=1,665 feet
Altitude of battery	=1,505 feet
Map shift (from base point)	=BDR 50
Direction of fire (Y-azimuth taken to nearest 100 mils)	=4,900

(2) Determine the elevation for range. From table A (column 2) note the elevations corresponding to 4,700 (168.2) and 4,800 (174.4). For range 4,780 interpolate as follows:

$$\begin{array}{rcl} \text{Elevation corresponding to 4,700} & & = 168.2 \\ 80/100 \times (174.4 - 168.2)^1 & & = 5.0 \end{array}$$

---


$$\text{Elevation corresponding to 4,780} \quad = 173.2 \text{ (use 173)}$$

(3) Compute the site. The target is 160 feet above the battery, giving a difference in altitude of +53 yards (minus when target is below guns). For range 4,800 (nearest 100 yards) the site is +53/4.8 or +11 mils. To correct the site (nonrigidity of trajectory) enter table A, line 4,800 and column 13, and note that for each +1 mil angle of site the correction is +0.05 mil. The complementary angle of site is, then,  $11 \times (+0.05)$  or +0.55 mil. This is taken as 1 mil (nearest mil), making the corrected site +12 mils (11+1). (Alternative method: Compute the corrected site directly by multiplying +11 by 1.05. This method adapts itself to slide-rule computation. The factor 1.05 is the numerical, not the algebraic, sum of unity plus the site correction for 1 mil.)

(4) The quadrant elevation is the algebraic sum of the corrected site and the elevation for range:

$$\begin{array}{rcl} \text{Elevation for range 4,780 ((2) above)} & & 173 \text{ mils} \\ \text{Corrected site ((3) above)} & & +12 \\ \hline \text{Quadrant elevation} & & 185 \text{ mils} \end{array}$$

(5) The battery executive reports that: The weight marking on the projectiles is + + +, or one cross above standard (par. 5a (15)). The powder temperature is 40° F. Now enter table B and note that a powder temperature of 40° changes the muzzle velocity from standard by -22 f/s.

(6) Enter table A, line 4,800 and column 10, and note that the metro message line number that will apply is 2.

---

<sup>1</sup> Instead of making this subtraction it is equally good practice to use the value c, found in column 4.



ABBREVIATED FIRING TABLES

(7) The following metro message has been received:

	MIF	MIF	
	3	12	35
0	57	25	97
1	59	27	96
2	59	29	96
3	60	32	95
4	60	33	95

The pertinent parts of the metro message are—

3	12	35
*	*	*
2	59	29
*	*	*

- 3 (Message applies to Field Artillery.)
- 12 (Altitude of MDP is 1,200 feet.)
- 35 (Air temperature at MDP is 35° F. This must be corrected to level of battery. See (8) below.)
- 2 (Line number that applies. See (6) above.)
- 59 (Ballistic wind blows from Y-azimuth 5,900.)
- 29 (Velocity of ballistic wind is 29 mph.)
- 96 (Ballistic density at MDP is 96 percent of standard. This must be corrected to level of battery. See (8) below.)

(8) Correct the air temperature and density to the level of the battery, using the corrected-density-and-temperature table and notes pertaining thereto on page 17.

Battery is 300 feet above MDP (1,505—1,200).

Corrected temperature =  $35 - (0.2 \times 3) = 34.4^\circ$ . (Use  $34^\circ$ .)

Corrected density =  $96 - (0.3 \times 3) = 95.1$  percent.

(Use 95 percent.)

(9) The variations from standard are now found to be:

Variation in weight of projectile =  $3$  (actually  $+++$ ) —  $2$  ( $++$  is standard) =  $+1$ . (Par. 5a(15))

Temperature variation =  $34^\circ$  (at battery) —  $59^\circ$  (standard) =  $-25^\circ$ . (Par. 5a(17).)

Density variation = 95 percent (at battery) — 100 percent (standard) =  $-5$  percent. (Par. 5a(19).)

(10) Determine chart direction of wind:

Wind direction ((7) above) (add 6,400 if necessary)	=5, 900
Minus direction of fire ((1) above)	=4, 900
Chart direction	1, 000

(11) Determine the wind components: Enter the wind-components table, page 16, with chart direction 1,000 ((10) above) and note that for a wind of 1 mph the cross wind is left 0.83 mph and the range wind is—0.56 mph. Multiplying these factors by 29, the reported wind velocity ((7) above), the cross wind is found to be left 24 mph and the range wind—16 mph.

NOTE.—The foregoing paragraphs contain the preliminary ground work necessary for determining the corrections for direction and range. Those that follow show in detail how to determine and apply these corrections.

(12) Compute the weather (cross-wind) correction, combine it with the drift correction, and apply the net correction thus determined to the map shift. To compute the weather effect multiply the cross wind of left 24 mph ((11) above) by the effect in mils of deflection (0.4 mil in this case—table A, line 4,800, column 12) of a cross wind of 1 mph. The result (left 9.6) taken to the nearest mil is left 10.

Factor	Effect	Correction
Drift (table A, line 4,800, column 11)_____	Right 5	Left 5
Weather (cross wind)_____	Left 10	Right 10
Net correction_____		Right 5
Map shift_____	BD Right 50	
Net correction_____		Right 5
Corrected direction = _____	BD Right 55	

(13) Calculate the net combined effect (in yards) of the various factors affecting range. The effect of any single factor is the product of its variation from standard by its unit effect in yards. The sign of the effect is that of the algebraic product. (Plus  $\times$  plus = *plus*; minus  $\times$  minus = *plus*; plus  $\times$  minus = *minus*; zero  $\times$  either plus or minus = *zero*.) The unit effects appear in table A, line 4,800, columns 15 to 19 inclusive, in an order which should be followed in tabulating the factors. Convert the net combined effect to a correction (in yards) by changing its sign, then convert the latter (which for most purposes is not in a usable form) into a correction in mils of quadrant elevation by dividing it by "yards per mil" (table A, line 4,800, column 5).

Column No.	Factor	Variation from standard	Unit effect	Range effect (yds)	
				+	-
15	Weight of projectile	((9) above) + 1 (cross)	+ 13	13	
16	Powder temperature	((5) above) - 22 (f/s)	+ 2. 1		46
17	Air temperature	((9) above) - 25 (degrees)	+ 1. 8		45
18	Range wind	((11) above) - 16 (mph)	+ 5. 7		91
19	Density	((9) above) - 5 (percent)	- 18	90	
Totals of effects (yards) .....				+ 103	- 182
Net effect (yards) (+ 103 - 182) .....				=	- 79
Net <i>correction</i> (yards) .....				=	+ 79
Yards per mil at 4,800 (table A, column 5) = 16					
Elevation correction (mils) (+ 79/16) .....				=	+ 5
Uncorrected quadrant elevation (par. (4) above)				185	
Elevation correction .....				+ 5	
Corrected quadrant elevation .....				190	

**8. Selection of appropriate charge.**—*a.* With the 155-mm howitzer, the propelling charge appropriate for use depends upon the range. A given range-line can usually be reached by more than one charge. The heavier the charge the greater the erosion of the bore. The lighter the charge the steeper the angle of fall and, in general, the greater the dispersion. Selecting too light a charge may necessitate stopping an adjustment and starting anew with a heavier charge. A registration made near the long limit of a charge will be useless for transfers to targets at greater ranges.

*b.* Mark each table A to indicate 75 percent and 85 percent, respectively, of the maximum range of its charge. For observed fires the charge selected should be such that the computed range to the target is not greater than 75 percent of the maximum range for that charge. Subject to these restrictions, select the lightest charge possible. Example: Adjust on a check point at range 6,600 with shell Mk. I, fuze M46. The maximum initial ranges for adjustment with charges 4, 5, and 6 (indicated in each case by the 75-percent mark in the appropriate table A) are, respectively, 5,250, 6,800, and 8,250. Charge 4 is manifestly too light. Charge 6 is needlessly heavy. Charge 5, then, is the proper selection.

*c.* For unobserved fires that are prepared from an accurate firing chart a charge can be used up to 85 percent of its maximum range without serious impairment of accuracy by dispersion.



## ABBREVIATED FIRING TABLES

## SECTION II

## TABLES COMMON TO ALL WEAPONS

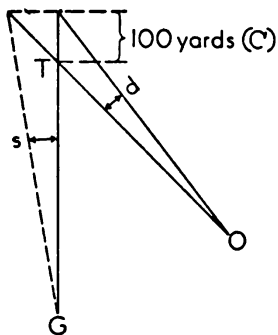
## CONVERSION FACTORS

1 yard	=	0.9144 meters
1 meter	=	1.0936 yards
1°	=	17.7778 mils
1'	=	0.2963 mils
1 mil	=	0.0563°
1 mil	=	3.375'

## NATURAL FUNCTIONS OF ANGLES IN MILS

Mils	sin	cos	tan	cot		Mils	sin	cos	tan	cot	
0	.0000	1.0000	.0000		1600	400	.3827	.9239	.4142	2.414	1200
10	.0098	.9998	.0098	101.9	90	10	.3917	.9201	.4258	2.349	90
20	.0196	.9998	.0196	50.92	80	20	.4008	.9162	.4374	2.286	80
30	.0295	.9996	.0295	33.94	70	30	.4097	.9122	.4492	2.226	70
40	.0393	.9992	.0393	25.45	60	40	.4187	.9081	.4610	2.169	60
50	.0491	.9988	.0491	20.36	50	50	.4276	.9040	.4730	2.114	50
60	.0589	.9983	.0590	16.96	40	60	.4364	.8998	.4850	2.062	40
70	.0687	.9976	.0688	14.53	30	70	.4452	.8954	.4972	2.011	30
80	.0785	.9969	.0787	12.71	20	80	.4540	.8910	.5095	1.963	20
90	.0882	.9961	.0886	11.29	10	90	.4627	.8865	.5220	1.916	10
100	.0980	.9952	.0985	10.15	1500	500	.4714	.8819	.5345	1.871	1100
10	.1078	.9942	.1084	9.224	90	10	.4800	.8773	.5472	1.827	90
20	.1175	.9931	.1184	8.449	80	20	.4886	.8725	.5600	1.786	80
30	.1273	.9919	.1283	7.793	70	30	.4972	.8677	.5730	1.745	70
40	.1370	.9906	.1383	7.230	60	40	.5057	.8627	.5861	1.706	60
50	.1467	.9892	.1483	6.741	50	50	.5141	.8577	.5994	1.668	50
60	.1564	.9877	.1584	6.314	40	60	.5225	.8526	.6128	1.632	40
70	.1661	.9861	.1685	5.936	30	70	.5308	.8475	.6264	1.596	30
80	.1758	.9844	.1786	5.600	20	80	.5391	.8422	.6401	1.562	20
90	.1855	.9827	.1887	5.299	10	90	.5474	.8369	.6541	1.529	10
200	.1951	.9808	.1989	5.027	1400	600	.5556	.8315	.6682	1.497	1000
10	.2047	.9788	.2091	4.781	90	10	.5637	.8260	.6825	1.465	90
20	.2143	.9768	.2194	4.558	80	20	.5718	.8204	.6970	1.435	80
30	.2239	.9746	.2297	4.353	70	30	.5798	.8148	.7117	1.405	70
40	.2335	.9724	.2401	4.165	60	40	.5878	.8090	.7265	1.376	60
50	.2430	.9700	.2505	3.992	50	50	.5957	.8032	.7417	1.348	50
60	.2525	.9676	.2610	3.832	40	60	.6036	.7973	.7570	1.321	40
70	.2620	.9651	.2715	3.684	30	70	.6114	.7914	.7725	1.294	30
80	.2714	.9625	.2820	3.546	20	80	.6191	.7853	.7883	1.268	20
90	.2809	.9597	.2927	3.417	10	90	.6268	.7792	.8044	1.243	10
300	.2903	.9569	.3034	3.297	1300	700	.6344	.7730	.8207	1.219	900
10	.2997	.9540	.3141	3.184	90	10	.6420	.7667	.8372	1.194	90
20	.3090	.9511	.3249	3.078	80	20	.6495	.7604	.8541	1.171	80
30	.3183	.9480	.3358	2.978	70	30	.6569	.7540	.8712	1.148	70
40	.3276	.9448	.3468	2.884	60	40	.6643	.7475	.8886	1.125	60
50	.3369	.9415	.3578	2.795	50	50	.6716	.7410	.9064	1.103	50
60	.3461	.9382	.3689	2.711	40	60	.6788	.7343	.9244	1.082	40
70	.3553	.9348	.3801	2.631	30	70	.6860	.7276	.9428	1.061	30
80	.3645	.9312	.3914	2.555	20	80	.6931	.7209	.9615	1.040	20
90	.3736	.9276	.4028	2.483	10	90	.7001	.7140	.9806	1.020	10
400	.3827	.9239	.4142	2.414	1200	800	.7071	.7071	1.0000	1.000	800
	cos	sin	cot	tan	Mils		cos	sin	cot	tan	Mils

## FIELD ARTILLERY

EXPLANATION OF *s* AND *d* TABLES

*G* is the gun.

*O* is the observer.

*T* is the target. It is also the angle *T* (*OTG*) (often referred to as the observer displacement and as the target offset in mils).

*R* is range *GT* in thousands of yards.

*r* is the distance *OT* in thousands of yards.

*d* is the deviation, as seen from *O*, caused by a range change of 100 yards (an elevation change of one *c*). Its value depends on the values of *T* and *r*.

*s* is the shift in deflection necessary to keep a shot on the *OT* line when making a range change of 100 yards (an elevation change of one *c*).

*s* TABLE

Range <i>GT</i> in yards	<i>T</i> in mils														
	100	200	300	400	500	600	700	800	900	1000	1100	1150	1200	1250	1300
2000	5	10	15	21	27	34	42	51	62	76	95	108	123	142	168
2100	5	10	15	20	26	32	40	49	59	73	91	103	117	136	160
2200	5	9	14	19	25	31	38	46	56	69	87	98	112	129	153
2300	4	9	13	18	24	30	36	44	54	66	83	94	107	124	146
2400	4	8	13	18	23	28	35	42	52	64	79	90	102	119	140
2500	4	8	12	17	22	27	33	41	50	61	76	86	98	114	134
2600	4	8	12	16	21	26	32	39	48	59	73	83	95	109	129
2700	4	8	11	16	20	25	31	38	46	56	71	80	91	105	124
2800	4	7	11	15	19	24	30	36	44	54	68	77	88	102	120
2900	3	7	11	15	19	23	29	35	43	53	66	74	85	98	116
3000	3	7	10	14	18	23	28	34	41	51	64	72	82	95	112
3200	3	6	10	13	17	21	26	32	39	48	60	67	77	89	105
3400	3	6	9	12	16	20	25	30	37	45	56	63	72	84	99
3600	3	6	9	12	15	19	23	28	34	42	53	60	68	79	93
3800	3	5	8	11	14	18	22	27	33	40	50	57	65	75	88
4000	3	5	8	11	14	17	21	25	31	38	48	54	61	71	84
4500	2	5	7	9	12	15	19	23	28	34	42	48	55	63	75
5000	2	4	6	8	11	14	17	20	25	31	38	43	49	57	67
5500	2	4	6	8	10	12	15	19	23	28	35	39	45	52	61
6000	2	3	5	7	9	11	14	17	21	25	32	36	41	47	56
6500	2	3	5	6	8	10	13	16	19	23	29	33	38	44	52
7000	1	3	4	6	8	10	12	15	18	22	27	31	35	41	48
7500	1	3	4	6	7	9	11	14	17	20	25	29	33	38	45
8000	1	3	4	5	7	9	10	13	16	19	24	27	31	36	42
8500	1	2	4	5	6	8	10	12	15	18	22	25	29	33	40
9000	1	2	3	5	6	8	9	11	14	17	21	24	27	32	37
9500	1	2	3	4	6	7	9	11	13	16	20	23	26	30	35
10000	1	2	3	4	5	7	8	10	12	15	19	22	25	28	34

## ABBREVIATED FIRING TABLES

d TABLE

Dis- tance OT in yards	T in mils												
	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
1000	10	20	30	39	48	57	65	72	79	85	90	94	97
1100	9	18	27	35	44	51	59	65	72	77	82	86	89
1200	8	17	25	32	40	47	54	60	66	71	75	78	81
1300	8	15	23	30	37	44	50	55	61	65	69	72	75
1400	7	14	21	28	34	40	46	51	56	60	64	67	70
1500	7	13	20	26	32	38	43	48	52	56	60	63	65
1600	6	12	18	24	30	35	40	45	49	53	56	59	61
1700	6	12	17	23	28	33	38	42	46	50	53	55	57
1800	6	11	16	22	27	31	36	40	44	47	50	52	54
1900	5	10	16	21	25	30	34	38	41	45	47	50	51
2000	5	10	15	20	24	28	32	36	39	42	45	47	49
2100	5	9	14	19	23	27	31	34	37	40	43	45	46
2200	5	9	13	18	22	26	29	33	36	38	41	43	44
2300	4	9	13	17	21	25	28	31	34	37	39	41	42
2400	4	8	12	16	20	24	27	30	33	35	37	39	41
2500	4	8	12	16	19	23	26	29	31	34	36	38	39
2600	4	8	11	15	18	22	25	28	30	33	35	36	37
2700	4	7	11	14	18	21	24	27	29	31	33	35	36
2800	4	7	11	14	17	20	23	26	28	30	32	34	35
2900	3	7	10	13	17	20	22	25	27	29	31	32	34
3000	3	7	10	13	16	19	22	24	26	28	30	31	32
3200	3	6	9	12	15	18	20	23	25	26	28	29	30
3400	3	6	9	11	14	17	19	21	23	25	26	28	29
3600	3	6	8	11	13	16	18	20	22	24	25	26	27
3800	3	5	8	10	13	15	17	19	21	22	24	25	26
4000	2	5	7	10	12	14	16	18	20	21	22	24	24
4500	2	4	7	9	11	13	14	16	18	19	20	21	22
5000	2	4	6	8	10	11	13	14	16	17	18	19	19
5500	2	4	5	7	9	10	12	13	14	15	16	17	18
6000	2	3	5	6	8	9	11	12	13	14	15	16	16
6500	2	3	5	6	7	9	10	11	12	13	14	14	15
7000	1	3	4	6	7	8	9	10	11	12	13	13	14
7500	1	3	4	5	6	8	9	10	11	11	12	13	13
8000	1	2	4	5	6	7	8	9	10	11	11	12	12

## FIELD ARTILLERY

## WIND COMPONENTS FOR 1-MILE-PER-HOUR WIND

Chart direction of wind	Cross wind mph	Range wind mph	Chart direction of wind	Cross wind mph	Range wind mph
0	0	-1.00	3200	0	+1.00
100	L .10	-.99	3300	R .10	+.99
200	L .20	-.98	3400	R .20	+.98
300	L .29	-.96	3500	R .29	+.96
400	L .38	-.92	3600	R .38	+.92
500	L .47	-.88	3700	R .47	+.88
600	L .56	-.83	3800	R .56	+.83
700	L .63	-.77	3900	R .63	+.77
800	L .71	-.71	4000	R .71	+.71
900	L .77	-.63	4100	R .77	+.63
1000	L .83	-.56	4200	R .83	+.56
1100	L .88	-.47	4300	R .88	+.47
1200	L .92	-.38	4400	R .92	+.38
1300	L .96	-.29	4500	R .96	+.29
1400	L .98	-.20	4600	R .98	+.20
1500	L .99	-.10	4700	R .99	+.10
1600	L 1.00	.00	4800	R 1.00	.00
1700	L .99	+.10	4900	R .99	-.10
1800	L .98	+.20	5000	R .98	-.20
1900	L .96	+.29	5100	R .96	-.29
2000	L .92	+.38	5200	R .92	-.38
2100	L .88	+.47	5300	R .88	-.47
2200	L .83	+.56	5400	R .83	-.56
2300	L .77	+.63	5500	R .77	-.63
2400	L .71	+.71	5600	R .71	-.71
2500	L .63	+.77	5700	R .63	-.77
2600	L .56	+.83	5800	R .56	-.83
2700	L .47	+.88	5900	R .47	-.88
2800	L .38	+.92	6000	R .38	-.92
2900	L .29	+.96	6100	R .29	-.96
3000	L .20	+.98	6200	R .20	-.98
3100	L .10	+.99	6300	R .10	-.99
3200	0	+1.00	6400	0	-1.00

This table divides a wind of 1 mile per hour, blowing from the chart direction, into two components: the cross wind, perpendicular to the plane of fire; and the range wind, parallel to the plane of fire. The chart direction is the Y-azimuth of the wind direction as given in the metro message (increased by 6400 when necessary) minus the Y-azimuth of the direction of fire.



## ABBREVIATED FIRING TABLES

## CORRECTED DENSITY AND TEMPERATURE

Height of battery with reference to the MDP (feet)	Change in—	
	Density (percent)	Temperature (°F.)
+600	-1.8	-1.2
+500	-1.5	-1.0
+400	-1.2	-0.8
+300	-0.9	-0.6
+200	-0.6	-0.4
+100	-0.3	-0.2
Same	0	0
-100	+0.3	+0.2
-200	+0.6	+0.4
-300	+0.9	+0.6
-400	+1.2	+0.8
-500	+1.5	+1.0
-600	+1.8	+1.2

Density decreases 0.3 percent for each 100 feet battery is above the MDP.  
Temperature decreases 0.2° F. for each 100 feet battery is above the MDP.

## CONVERSION TABLE

Degrees and minutes to mils

Degrees by 10's	Mils	Degrees	Mils	Minutes by 10's	Mils	Minutes	Mils	Minutes in tenths	Mils
10°	177.78	1°	17.78	10'	2.96	1'	.30	.1'	.03
20°	355.56	2°	35.56	20'	5.93	2'	.59	.2'	.06
30°	533.33	3°	53.33	30'	8.89	3'	.89	.3'	.09
40°	711.11	4°	71.11	40'	11.85	4'	1.19	.4'	.12
50°	888.89	5°	88.89	50'	14.82	5'	1.48	.5'	.15
60°	1066.67	6°	106.67			6'	1.78	.6'	.18
70°	1244.44	7°	124.44			7'	2.07	.7'	.21
80°	1422.22	8°	142.22			8'	2.37	.8'	.24
90°	1600.00	9°	160.00			9'	2.67	.9'	.27
100°	1777.78								
110°	1955.56								
120°	2133.33								
130°	2311.11								
140°	2488.89								
150°	2666.67								
160°	2844.44								
170°	3022.22								

For example, to convert 78°43.6' to mils:			
70°	=	1244.44	mils
8°	=	142.22	"
40'	=	11.85	"
3'	=	.89	"
.6'	=	.18	"
<hr/>			
78°43.6'	=	1399.58	mils

## FIELD ARTILLERY

## SECTION III

## FIRING TABLES, 75-MM GUN

Characteristics of 75-mm gun M1897, M1897A1, M1897A2, M1897-A3, and M1897A4, firing HE shell Mk. I and shrapnel Mk. I:

## 75-MM GUN

Diameter of the bore between lands.....	inches..	2. 953
Diameter of the bore between grooves.....	do ..	2. 992
Total length.....	do ..	107. 126
Length of rifled portion.....	do ..	87. 772
Travel of projectile.....	do ..	89. 9
Capacity of powder chamber.....	cubic inches..	83
Number of grooves.....		24
Character of rifling.....	{ uniform twist 1 in 25.6 calibers	
Maximum pressure for which gun is designed		
	pounds/square inch..	36, 000
Weight of gun and breech mechanism.....	pounds..	1, 035

## 75-MM GUN CARRIAGE M2

	<i>On wheels</i>	<i>On firing jack</i>
Maximum traverse, right.....	mils 800	800
Maximum traverse, left.....	do 711	711
Least possible elevation.....	do —178	—178
Greatest possible elevation.....	do 818	821
Traverse for one turn of traversing hand- wheel.....	do 19. 0	19. 0
Change in elevation for one turn of elevating handwheel.....	do 10	10
Maximum range scale setting.....	yards 9, 760	9, 760

## 75-MM GUN CARRIAGE M1897 (AND MODIFICATIONS)

Total traverse (one-half on each side).....	mils..	106
Least possible elevation.....	do ..	—178
Greatest possible elevation.....	do ..	338
Traverse for one turn of traversing handwheel.....	do ..	1. 8
Change in elevation for one turn of elevating handwheel.....	do ..	8
Maximum range scale setting.....	meters..	5, 500

ABBREVIATED FIRING TABLES

PROJECTILE—MEAN WEIGHT OF FUZED PROJECTILE IN POUNDS

*Shrapnel*.—Standardized at 15.96 pounds.

*HE shell Mk. I*.—P. D. fuzes M46 and M47.

Variations in weight are indicated by markings stenciled on the projectile as follows:

Marking	Weight
L	11.58
+	11.91
+ + (standard)	12.24
+ + +	12.57
+ + + +	12.90

FUZES

21-second combination time and percussion.

Point detonating fuzes:

M46 (nose painted white).....superquick.

M47 (nose painted black).....delay.

Characteristics of combinations of projectile, charge, and fuze for which tables are not included herein:

*HE shell Mk. I, fuzes (short) Mk. IV and Mk. V, reduced charge:*

Muzzle velocity, 1,130 f/s; maximum range, 6,965 yards.

*HE shell Mk. I, fuzes (short) Mk. IV and Mk. V, normal charge:* Muzzle velocity, 1,805 f/s; maximum range, 8,915 yards.

*HE shell Mk. I, fuze, (long) Mk. III, normal charge:* Muzzle velocity, 1,778 f/s; maximum range, 8,175 yards.

*Chemical shell Mk. II, fuzes M46 and M47, reduced charge:* Muzzle velocity, 1,115 f/s; maximum range, 6,425 yards.

*Chemical shell Mk. II, fuzes M46 and M47, normal charge:* Muzzle velocity, 1,758 f/s; maximum range, 8,810 yards.

*Chemical shell Mk. II, fuzes (short) Mk. IV and Mk. V, reduced charge:* Muzzle velocity, 1,130 f/s; maximum range, 6,400 yards.

*Chemical shell Mk. II, fuzes (short) Mk. IV and Mk. V, normal charge:* Muzzle velocity, 1,805 f/s; maximum range, 8,400 yards.

*Chemical shell Mk. II, fuze (long) Mk. III, normal charge:* Muzzle velocity, 1,778 f/s; maximum range, 7,925 yards.

## ABBREVIATED FIRING TABLES

## SHRAPNEL MK. I

*Fuze 21-second combination*

NOTE.—Elevations given in this table are for carriage M2. Add 0.8 mil to these elevations when firing from carriage M1897 (and modifications).

Muzzle velocity: 1,755 f/s.

Maximum range: 9,760 yards.

(Data for ranges 0-8000 included herein.)

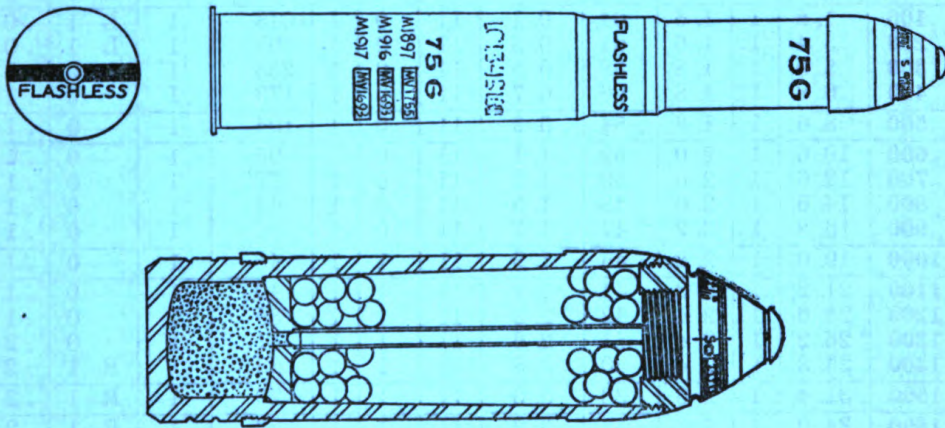




TABLE A

1	2	3	4	5	6	7	8	9	10	11	12
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message L	Deflection effect	
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>			Drift* Dft.	Lateral wind of 1 mile per hour (+) W-D
yd.	m	m	m	yd.	sec.	yd.	yd.	1/-	No.	m	m
0	-1.2	1	4.0	25	0.0	8	0		1	L 1	0.0
100	+2.8	1	4.0	25	0.3	8	0	239	1	L 1	0.0
200	6.8	1	4.2	24	0.6	8	0	119	1	L 1	0.0
300	11.0	1	4.2	24	0.8	9	0	78	1	L 1	0.0
400	15.2	1	4.2	24	1.1	9	0	58	1	L 1	0.0
500	19.6	2	4.4	23	1.4	9	0	45	1	L 1	0.0
600	24.0	2	4.4	23	1.7	9	0	37	1	0	0.0
700	28.4	2	4.6	22	2.0	9	0	31	1	0	0.0
800	33.0	2	4.6	22	2.3	10	0	27	1	0	0.0
900	37.8	2	4.8	21	2.6	10	0	24	1	0	0.0
1000	42.6	2	4.8	21	2.9	10	0	21	1	0	0.1
1100	47.4	2	4.8	21	3.2	10	0	18.8	1	0	0.1
1200	52.4	2	5.0	20	3.5	10	0	16.9	1	0	0.1
1300	57.4	2	5.0	20	3.9	11	0	15.3	1	0	0.1
1400	62.6	2	5.2	20	4.2	11	0	14.0	1	R 1	0.1
1500	67.8	2	5.2	19	4.5	11	0	12.9	1	R 1	0.1
1600	73.2	2	5.4	19	4.8	11	0	11.9	1	R 1	0.1
1700	78.6	2	5.4	19	5.2	11	0	11.0	1	R 1	0.1
1800	84.2	3	5.6	18	5.5	12	0	10.3	1	R 1	0.1
1900	89.8	3	5.6	18	5.9	12	0	9.6	1	R 1	0.1
2000	95.4	3	5.8	18	6.2	12	0	9.0	1	R 1	0.1
2100	101.2	3	5.8	17	6.6	12	0	8.4	1	R 1	0.1
2200	107.2	3	6.0	17	6.9	13	0	7.9	1	R 1	0.2
2300	113.2	3	6.0	17	7.3	13	0	7.4	1	R 1	0.2
2400	119.4	3	6.2	16	7.6	13	0	7.0	1	R 1	0.2
2500	125.6	3	6.2	16	8.0	13	0	6.6	1	R 1	0.2
2600	132.0	3	6.4	16	8.4	14	0	6.3	1	R 1	0.2
2700	138.4	3	6.6	15	8.8	14	0	6.0	1	R 1	0.2
2800	145.0	4	6.6	15	9.1	14	0	5.7	1	R 2	0.2
2900	151.8	4	6.8	15	9.5	14	0	5.4	1	R 2	0.2
3000	158.6	4	6.8	15	9.9	15	0	5.1	1	R 2	0.2
3100	165.6	4	7.0	14	10.3	15	0	4.9	1	R 2	0.2
3200	172.6	4	7.2	14	10.7	15	0	4.7	1	R 3	0.2
3300	179.8	5	7.4	14	11.1	15	0	4.4	1	R 3	0.3
3400	187.2	5	7.4	14	11.5	16	0	4.2	1	R 3	0.3
3500	194.8	5	7.6	13	11.9	16	0	4.1	1	R 4	0.3
3600	202.4	5	7.8	13	12.3	16	0	3.9	2	R 4	0.3
3700	210.2	5	8.0	13	12.8	17	0	3.7	2	R 4	0.3
3800	218.2	6	8.2	12	13.2	17	0	3.6	2	R 5	0.3
3900	226.4	6	8.2	12	13.7	17	0	3.4	2	R 5	0.3
4000	234.6	6	8.4	12	14.1	18	0	3.3	2	R 5	0.3

\*Drift includes side jump.



## ABBREVIATED FIRING TABLES

TABLE A—Continued

13	14	15	16	17	18	19	20	21	1
Complementary angle of site for each		Range effect of increase of—							
+ 1 mil of site	- 1 mil of site	One + in weight of projectile. Two + is stand- ard	One foot per second in MV	Air temperature 1°. Standard is 59° F.	Rear wind 1 mile per hour	One percent in air density	Range setting for 1887 carriage (and models)	Range setting for M2 carriage	Range
m	m	Wt.	VE	Temp.	W-R	Den.	Set.	Set.	R
m	m	yd.	yd.	yd.	yd.	yd.	m.	yd.	yd.
.00	.00	0	0.0	0.0	0.0	0	85	-145	0
.00	.00	-2	+0.2	0.0	0.0	0	340	+130	100
.00	.00	-3	+0.3	+0.1	0.0	0	535	380	200
.00	.00	-5	+0.5	+0.1	+0.1	0	715	605	300
.00	.00	-6	+0.6	+0.2	+0.1	0	890	815	400
.00	.00	-8	+0.8	+0.2	+0.1	-1	1065	1010	500
.00	.00	-9	+0.9	+0.3	+0.2	-1	1230	1195	600
.00	.00	-10	+1.0	+0.3	+0.2	-1	1390	1375	700
.00	.00	-11	+1.1	+0.4	+0.3	-1	1550	1550	800
.00	.00	-12	+1.2	+0.4	+0.3	-1	1605	1720	900
.00	.00	-13	+1.3	+0.5	+0.4	-1	1860	1890	1000
.00	.00	-14	+1.4	+0.6	+0.5	-1	2010	2050	1100
+.01	.00	-14	+1.5	+0.6	+0.6	-2	2160	2205	1200
+.01	.00	-15	+1.6	+0.7	+0.8	-2	2310	2360	1300
+.01	.00	-15	+1.7	+0.7	+0.9	-2	2455	2515	1400
+.01	.00	-16	+1.8	+0.8	+1.0	-2	2600	2665	1500
+.01	-.01	-16	+1.8	+0.9	+1.2	-2	2740	2810	1600
+.01	-.01	-16	+1.9	+0.9	+1.3	-2	2880	2955	1700
+.02	-.01	-17	+2.0	+1.0	+1.5	-3	3020	3100	1800
+.02	-.01	-17	+2.0	+1.0	+1.6	-3	3155	3240	1900
+.02	-.02	-17	+2.1	+1.1	+1.8	-3	3290	3380	2000
+.02	-.02	-17	+2.2	+1.2	+2.0	-3	3425	3520	2100
+.02	-.02	-17	+2.2	+1.2	+2.2	-4	3560	3660	2200
+.03	-.02	-16	+2.3	+1.3	+2.3	-4	3690	3800	2300
+.03	-.03	-16	+2.3	+1.3	+2.5	-4	3820	3935	2400
+.03	-.03	-16	+2.4	+1.4	+2.7	-4	3950	4070	2500
+.03	-.03	-16	+2.4	+1.5	+2.9	-5	4080	4205	2600
+.04	-.03	-15	+2.5	+1.5	+3.1	-5	4210	4340	2700
+.04	-.04	-15	+2.5	+1.6	+3.3	-5	4335	4470	2800
+.04	-.04	-14	+2.5	+1.6	+3.5	-6	4460	4605	2900
+.04	-.04	-14	+2.6	+1.7	+3.7	-6	4585	4735	3000
+.05	-.05	-13	+2.6	+1.8	+3.9	-6	4710	4870	3100
+.05	-.05	-13	+2.7	+1.9	+4.1	-7	4835	5000	3200
+.05	-.05	-12	+2.7	+1.9	+4.4	-7	4955	5135	3300
+.06	-.06	-12	+2.7	+2.0	+4.6	-7	5075	5265	3400
+.06	-.06	-12	+2.8	+2.1	+4.8	-8	5195	5395	3500
+.06	-.06	-11	+2.8	+2.2	+5.0	-8	5320	5530	3600
+.07	-.07	-11	+2.8	+2.2	+5.3	-8	5440	5660	3700
+.07	-.07	-10	+2.9	+2.3	+5.5	-9	5560	5790	3800
+.08	-.08	-10	+2.9	+2.3	+5.8	-9		5920	3900
+.08	-.08	-10	+3.0	+2.4	+6.0	-9		6050	4000



## FIELD ARTILLERY

TABLE A—Continued

1	2	3	4	5	6	7	8	9	10	11	12
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation yd.	Time of flight Time sec.	Probable error		Slope of fall Slope 1/-	Line number of metro message L No.	Deflection effect	
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>			Drift* Dft.	Lateral wind of 1 mile per hour (+) W-D
yd.	m	m	m	yd.	sec.	yd.	yd.			m	m
4000	234.6	6	8.4	12	14.1	18	0	3.3	2	R 5	0.3
4100	243.0	6	8.6	12	14.6	18	0	3.1	2	R 6	0.3
4200	251.8	7	8.8	11	15.1	19	0	3.0	2	R 6	0.3
4300	260.8	7	9.0	11	15.5	19	0	2.9	2	R 6	0.4
4400	269.8	7	9.2	11	16.0	20	0	2.8	2	R 7	0.4
4500	279.2	8	9.4	11	16.5	20	0	2.7	2	R 7	0.4
4600	288.8	8	9.6	10	17.0	21	0	2.6	2	R 7	0.4
4700	298.8	8	10.0	10	17.5	21	0	2.5	2	R 8	0.4
4800	309.0	9	10.4	10	18.1	22	0	2.4	2	R 8	0.4
4900	319.4	9	10.6	9	18.6	22	0	2.3	2	R 9	0.4
5000	330.2	10	11.0	9	19.1	23	0	2.2	2	R 9	0.4
5100	341.4	10	11.2	9	19.7	24	0	2.1	3	R 10	0.5
5200	352.8	11	11.6	9	20.3	24	0	2.0	3	R 10	0.5
5300	364.8	12	12.0	8	20.8	25	0	1.93	3	R 11	0.5
5400	377.2	13	12.6	8	21.4	25	0	1.85	3	R 11	0.5
5500	390.0	14	13.2	8	22.0	26	0	1.78	3	R 12	0.5
5600	403.4	15	13.8	7	22.6	26	0	1.70	3	R 13	0.5
5700	417.6	16	14.4	7	23.3	27	0	1.63	3	R 14	0.5
5800	432.4	17	15.2	7	24.0	27	0	1.56	3	R 15	0.6
5900	448.0	18	16.0	6	24.8	28	0	1.49	3	R 16	0.6
6000	464.6	20	17.2	6	25.6	29	1	1.42	3	R 17	0.6
6100	482.4	22	18.6	5	26.4	30	1	1.35	3	R 18	0.6
6200	501.8	25	20.2	5	27.3	31	1	1.28	4	R 19	0.6
6300	523.0	28	22.0	5	28.2	32	1	1.22	4	R 20	0.7
6400	546.2	32	24.4	4	29.2	33	1	1.15	4	R 22	0.7
6500	572.0	38	28.2	4	30.3	34	1	1.08	4	R 24	0.7
6600	603.2	52	36.4	3	31.6	36	1	1.00	5	R 26	0.8
6700	647.2				33.4	39	1	0.91	5	R 31	0.9
6775	730.8				36.7	45	1	0.76	5	R 40	1.0
6700	817.4				39.8	52	1	0.63	5	R 50	1.0

\*Drift includes side jump.







## FIELD ARTILLERY

TABLE B.—*Change in velocity due to change in temperature of powder—*

Temperature of Powder, F-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second-----	-23	-20	-17	-14	-11	-7	-4	0	+3	+7	+11

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards-----	1000	2000	3000	4000	5000	5500	6000
Cant of 10 mils, effect-----	0.4	0.9	1.6	2.4	3.4	4.0	4.9
Range, yards-----	6000	6500	6600	6700	6775	6700	
Cant of 10 mils, effect-----	4.9	6.3	6.7	7.4	8.7	10.4	

NOTE.—Right wheel above left causes left deflection effect. The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.









ABBREVIATED FIRING TABLES

HE SHELL, MK. I

*Fuzes M46 and M47*

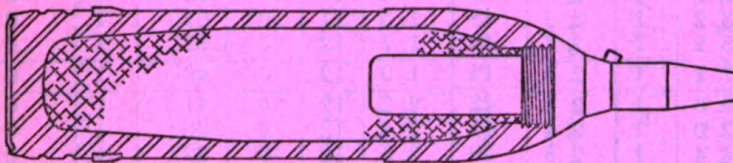
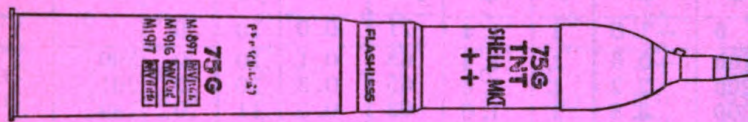
*(normal charge)*

NOTE.—Elevations given in this table are for carriage M2. Add 0.8 mil to these elevations when firing from carriage M1897 (and modifications).

Muzzle velocity: 1,784 f/s.

Maximum range: 9,000 yards.

(Data for ranges 0-8000 included herein.)





## FIELD ARTILLERY

TABLE A

1	2	3	4	5	6	7	8	9	10	11	12
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line	Deflection effect	
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>			Drift* Dft.	Lateral wind of 1 mile per hour (+) W-D
yd.	m	m	m	yd.	sec.	yd.	yd.	1/—	No.	m	m
0	-1.0	1	1.4	71	0.0	10	0		1	L 1	.0
100	+0.6	1	1.4	68	0.1	10	0	599	1	L 1	.0
200	2.2	1	1.6	65	0.3	10	0	291	1	L 1	.0
300	3.8	1	1.6	62	0.5	11	0	189	1	0	.0
400	5.6	1	1.8	59	0.7	11	0	140	1	0	.0
500	7.4	1	1.8	56	0.9	11	0	109	1	0	.0
600	9.2	1	2.0	53	1.1	11	0	88	1	0	.0
700	11.2	1	2.0	50	1.3	11	0	73	1	0	.0
800	13.2	1	2.2	48	1.5	11	0	62	1	0	.0
900	15.2	1	2.2	46	1.7	12	0	53	1	0	.0
1000	17.4	1	2.2	44	1.9	12	0	46	1	0	.0
1100	19.6	1	2.4	42	2.2	12	0	41	1	0	.0
1200	22.0	1	2.4	41	2.4	12	0	36	1	0	.0
1300	24.4	1	2.6	39	2.6	12	0	32	1	0	.0
1400	27.0	1	2.6	38	2.9	12	0	29	1	0	.0
1500	29.6	1	2.8	37	3.1	13	0	26	1	R 1	.1
1600	32.4	1	2.8	36	3.4	13	0	23	1	R 1	.1
1700	35.2	2	3.0	34	3.6	13	0	21	1	R 1	.1
1800	38.0	2	3.0	33	3.9	13	0	19.2	1	R 1	.1
1900	41.0	2	3.2	32	4.2	14	0	17.6	1	R 1	.1
2000	44.2	2	3.2	31	4.4	14	0	16.2	1	R 1	.1
2100	47.4	2	3.4	30	4.7	14	0	14.9	1	R 1	.1
2200	50.8	2	3.4	29	5.0	14	0	13.8	1	R 1	.1
2300	54.2	2	3.6	28	5.3	15	0	12.8	1	R 1	.1
2400	57.8	2	3.6	27	5.6	15	0	11.9	1	R 2	.1
2500	61.4	2	3.8	26	5.9	15	0	11.1	1	R 2	.1
2600	65.2	2	3.8	26	6.2	15	0	10.4	1	R 2	.1
2700	69.0	3	4.0	25	6.5	16	0	9.8	1	R 2	.2
2800	73.0	3	4.0	25	6.8	16	0	9.2	1	R 2	.2
2900	77.0	3	4.2	24	7.1	16	0	8.6	1	R 2	.2
3000	81.2	3	4.2	24	7.4	17	0	8.1	1	R 2	.2
3100	85.4	3	4.4	23	7.7	17	0	7.7	1	R 2	.2
3200	89.8	3	4.4	23	8.1	17	0	7.3	1	R 3	.2
3300	94.4	3	4.6	22	8.4	18	0	6.9	1	R 3	.2
3400	99.0	3	4.6	22	8.7	18	0	6.6	1	R 3	.2
3500	103.6	3	4.8	21	9.1	18	0	6.3	1	R 3	.2
3600	108.4	4	4.8	21	9.4	19	0	6.0	1	R 3	.2
3700	113.4	4	5.0	20	9.8	19	0	5.7	1	R 3	.2
3800	118.4	4	5.0	20	10.1	20	0	5.4	1	R 3	.3
3900	123.4	4	5.2	19	10.5	20	0	5.2	1	R 4	.3
4000	128.6	4	5.2	19	10.8	21	0	5.0	1	R 4	.3

\*Drift includes side jump.



## ABBREVIATED FIRING TABLES

TABLE A—Continued

13	14	15	16	17	18	19	20	21	1
Complementary angle of site for each		Range effect of increase of—							
+ 1 mil of site	- 1 mil of site	One + in weight of projectile. Two ++ is stan- dard Wt.	One foot per second in MV VE	Air temperature 1° Standard is 59° F. Temp.	Rear wind 1 mile per hour W-R	One percent in air density Den.	Range setting for 1897 car- riage (and models) Set.	Range setting for M2 car- riage Set.	Range R
m	m	yd.	yd.	yd.	yd.	yd.	m.	yd.	yd.
.00	.00	0	0.0	0.0	0.0	0	85	-135	0
.00	.00	-1	+0.1	0.0	0.0	0	170	-30	100
.00	.00	-2	+0.2	0.0	0.0	0	270	+75	200
.00	.00	-4	+0.3	0.0	0.0	-1	360	170	300
.00	.00	-5	+0.4	0.0	0.0	-1	445	270	400
.00	.00	-6	+0.5	0.0	0.0	-1	530	380	500
.00	.00	-7	+0.6	0.0	+0.1	-2	615	490	600
.00	.00	-7	+0.7	0.0	+0.1	-2	700	600	700
.00	.00	-8	+0.7	+0.1	+0.1	-2	785	700	800
.00	.00	-8	+0.8	+0.1	+0.2	-2	870	800	900
.00	.00	-8	+0.9	+0.1	+0.2	-3	960	900	1000
.00	.00	-9	+0.9	+0.1	+0.3	-3	1050	1000	1100
.00	.00	-9	+1.0	+0.1	+0.3	-3	1140	1100	1200
.00	.00	-9	+1.1	+0.2	+0.4	-3	1230	1205	1300
.00	.00	-9	+1.1	+0.2	+0.4	-4	1320	1305	1400
.00	.00	-10	+1.2	+0.2	+0.5	-4	1410	1410	1500
.00	.00	-10	+1.3	+0.2	+0.5	-4	1510	1520	1600
.00	.00	-10	+1.3	+0.2	+0.6	-5	1605	1625	1700
+.01	-.01	-10	+1.4	+0.3	+0.7	-5	1700	1725	1800
+.01	-.01	-10	+1.5	+0.3	+0.8	-6	1800	1830	1900
+.01	-.01	-10	+1.5	+0.3	+0.9	-6	1900	1935	2000
+.01	-.01	-9	+1.6	+0.3	+1.0	-6	2000	2040	2100
+.01	-.01	-9	+1.6	+0.4	+1.1	-7	2105	2145	2200
+.01	-.01	-9	+1.6	+0.4	+1.2	-7	2205	2250	2300
+.01	-.01	-8	+1.7	+0.4	+1.3	-8	2305	2360	2400
+.01	-.01	-8	+1.7	+0.5	+1.5	-8	2410	2470	2500
+.01	-.01	-7	+1.7	+0.5	+1.6	-8	2515	2575	2600
+.01	-.01	-7	+1.7	+0.6	+1.8	-9	2615	2685	2700
+.02	-.02	-6	+1.8	+0.6	+1.9	-9	2720	2795	2800
+.02	-.02	-5	+1.8	+0.7	+2.1	-10	2825	2905	2900
+.02	-.02	-4	+1.8	+0.7	+2.3	-10	2930	3015	3000
+.02	-.02	-3	+1.8	+0.8	+2.5	-10	3035	3120	3100
+.02	-.02	-2	+1.8	+0.8	+2.7	-11	3140	3230	3200
+.02	-.02	-1	+1.9	+0.9	+2.8	-11	3250	3345	3300
+.02	-.02	0	+1.9	+0.9	+3.0	-12	3360	3460	3400
+.02	-.02	0	+1.9	+1.0	+3.2	-12	3470	3570	3500
+.02	-.02	+1	+1.9	+1.0	+3.4	-13	3580	3680	3600
+.03	-.03	+2	+1.9	+1.1	+3.6	-13	3685	3790	3700
+.03	-.03	+3	+1.9	+1.1	+3.7	-14	3790	3900	3800
+.03	-.03	+4	+1.9	+1.2	+3.9	-14	3895	4015	3900
+.03	-.03	+5	+2.0	+1.3	+4.1	-15	4000	4125	4000



TABLE A—Continued

1	2	3	4	5	6	7	8	9	10	11	12
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line	Deflection effect	
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>			Drift* Dft.	Lateral wind of 1 mile per hour (+) W-D
yd.	m	m	m	yd.	sec.	yd.	yd.	1/—	No.	m	m
4000	128.6	4	5.2	19	10.8	21	0	5.0	1	R 4	.3
4100	134.0	5	5.4	19	11.2	21	0	4.8	1	R 4	.3
4200	139.4	5	5.4	18	11.6	22	0	4.6	1	R 4	.3
4300	144.8	5	5.6	18	12.0	22	0	4.4	2	R 4	.3
4400	150.4	5	5.8	18	12.3	22	1	4.2	2	R 4	.3
4500	156.2	5	5.8	17	12.7	23	1	4.0	2	R 5	.3
4600	162.2	6	6.0	17	13.1	23	1	3.9	2	R 5	.3
4700	168.2	6	6.0	17	13.5	24	1	3.7	2	R 5	.4
4800	174.4	6	6.2	16	13.9	24	1	3.6	2	R 5	.4
4900	180.6	6	6.4	16	14.3	25	1	3.5	2	R 5	.4
5000	187.0	6	6.4	16	14.7	25	1	3.3	2	R 6	.4
5100	193.4	7	6.6	15	15.1	26	1	3.2	2	R 6	.4
5200	200.0	7	6.6	15	15.6	26	1	3.1	2	R 6	.4
5300	206.8	7	6.8	15	16.0	27	1	3.0	2	R 6	.4
5400	213.6	8	7.0	14	16.4	27	1	2.9	2	R 7	.4
5500	220.6	8	7.0	14	16.9	28	1	2.8	2	R 7	.5
5600	227.8	8	7.2	14	17.3	29	1	2.7	2	R 7	.5
5700	235.0	9	7.4	13	17.7	29	1	2.6	2	R 8	.5
5800	242.4	9	7.6	13	18.2	30	1	2.5	2	R 8	.5
5900	250.0	9	7.6	13	18.7	30	1	2.4	2	R 8	.5
6000	257.6	10	7.8	13	19.1	31	1	2.3	3	R 9	.5
6100	265.6	10	8.0	12	19.6	32	1	2.3	3	R 9	.5
6200	273.6	11	8.2	12	20.1	32	1	2.2	3	R 9	.6
6300	281.8	11	8.4	12	20.5	33	1	2.1	3	R 10	.6
6400	290.2	12	8.6	12	21.0	34	1	2.0	3	R 10	.6
6500	298.8	12	8.8	11	21.5	34	1	1.98	3	R 11	.6
6600	307.6	13	9.0	11	22.0	35	1	1.92	3	R 11	.6
6700	316.6	13	9.2	11	22.6	36	1	1.86	3	R 12	.6
6800	325.8	14	9.4	11	23.1	37	1	1.80	3	R 12	.7
6900	335.4	14	9.6	10	23.6	37	1	1.74	3	R 13	.7
7000	345.2	15	9.8	10	24.2	38	1	1.68	3	R 13	.7
7100	355.2	16	10.0	10	24.7	39	1	1.63	3	R 14	.7
7200	365.4	16	10.2	10	25.2	40	1	1.58	3	R 14	.7
7300	376.0	17	10.6	9	25.8	41	1	1.53	3	R 15	.8
7400	386.8	18	10.8	9	26.4	42	1	1.48	4	R 15	.8
7500	398.0	19	11.2	9	27.1	43	1	1.43	4	R 16	.8
7600	409.4	21	11.6	9	27.7	44	1	1.38	4	R 16	.8
7700	421.2	22	12.0	8	28.3	45	1	1.34	4	R 17	.8
7800	433.4	23	12.4	8	29.0	46	1	1.29	4	R 18	.8
7900	446.0	24	13.0	8	29.7	47	1	1.25	4	R 19	.9
8000	459.2	26	13.6	7	30.4	48	1	1.20	4	R 20	.9

\*Drift includes side jump.



## ABBREVIATED FIRING TABLES

TABLE A—Continued

13	14	15	16	17	18	19	20	21	1
Complementary angle of site for each		Range effect of increase of—					Range setting for 1897 carriage (and models)	Range setting for M2 carriage	Range
+ 1 mil of site	— 1 mil of site	One + in weight of projectile. Two + is standard	One foot per second in MV	Air temperature 1°. Standard is 59° F.	Rear wind 1 mile per hour	One percent in air density			
Wt.	VE	Temp.	W-R	Den.	Set.	Set.	R		
m	m	yd.	yd.	yd.	yd.	yd.	m.	yd.	yd.
+ .03	— .03	+ 5	+ 2.0	+ 1.3	+ 4.1	— 15	4000	4125	4000
+ .03	— .03	+ 6	+ 2.0	+ 1.3	+ 4.3	— 15	4105	4240	4100
+ .03	— .03	+ 7	+ 2.0	+ 1.4	+ 4.5	— 16	4210	4350	4200
+ .04	— .04	+ 8	+ 2.0	+ 1.5	+ 4.7	— 16	4320	4455	4300
+ .04	— .04	+ 9	+ 2.0	+ 1.5	+ 4.9	— 17	4430	4565	4400
+ .04	— .04	+ 10	+ 2.0	+ 1.6	+ 5.1	— 17	4540	4680	4500
+ .04	— .04	+ 11	+ 2.0	+ 1.6	+ 5.3	— 17	4645	4795	4600
+ .04	— .04	+ 12	+ 2.0	+ 1.7	+ 5.5	— 18	4750	4910	4700
+ .05	— .05	+ 13	+ 2.1	+ 1.8	+ 5.7	— 18	4855	5025	4800
+ .05	— .05	+ 14	+ 2.1	+ 1.9	+ 5.9	— 19	4955	5140	4900
+ .05	— .05	+ 16	+ 2.1	+ 2.0	+ 6.2	— 19	5060	5250	5000
+ .05	— .05	+ 17	+ 2.1	+ 2.1	+ 6.4	— 20	5165	5360	5100
+ .05	— .05	+ 18	+ 2.1	+ 2.2	+ 6.7	— 20	5270	5475	5200
+ .06	— .06	+ 20	+ 2.1	+ 2.2	+ 6.9	— 21	5375	5590	5300
+ .06	— .06	+ 21	+ 2.1	+ 2.3	+ 7.1	— 21	5480	5700	5400
+ .06	— .06	+ 22	+ 2.1	+ 2.4	+ 7.4	— 22	5575	5815	5500
+ .07	— .07	+ 23	+ 2.1	+ 2.5	+ 7.6	— 22	Quadrant aiming	5935	5600
+ .07	— .07	+ 24	+ 2.1	+ 2.6	+ 7.9	— 23		6050	5700
+ .07	— .07	+ 26	+ 2.2	+ 2.6	+ 8.1	— 23		6165	5800
+ .08	— .08	+ 27	+ 2.2	+ 2.7	+ 8.3	— 24		6275	5900
+ .08	— .08	+ 28	+ 2.2	+ 2.8	+ 8.6	— 25		6385	6000
+ .09	— .09	+ 29	+ 2.2	+ 2.9	+ 8.8	— 25		6500	6100
+ .09	— .09	+ 31	+ 2.2	+ 3.0	+ 9.1	— 26		6615	6200
+ .10	— .10	+ 32	+ 2.2	+ 3.0	+ 9.3	— 26		6730	6300
+ .10	— .10	+ 34	+ 2.2	+ 3.1	+ 9.5	— 27		6840	6400
+ .11	— .11	+ 35	+ 2.2	+ 3.2	+ 9.8	— 27		6955	6500
+ .11	— .11	+ 36	+ 2.3	+ 3.3	+ 10.0	— 28		7070	6600
+ .12	— .12	+ 37	+ 2.3	+ 3.4	+ 10.3	— 28		7185	6700
+ .13	— .12	+ 39	+ 2.3	+ 3.4	+ 10.5	— 29		7300	6800
+ .14	— .13	+ 40	+ 2.3	+ 3.5	+ 10.8	— 29		7415	6900
+ .15	— .14	+ 41	+ 2.3	+ 3.6	+ 11.1	— 30		7530	7000
+ .16	— .14	+ 42	+ 2.3	+ 3.7	+ 11.4	— 30		7640	7100
+ .17	— .15	+ 44	+ 2.4	+ 3.8	+ 11.7	— 31		7760	7200
+ .18	— .16	+ 45	+ 2.4	+ 3.8	+ 11.9	— 31		7870	7300
+ .19	— .17	+ 47	+ 2.4	+ 3.9	+ 12.2	— 32		7985	7400
+ .20	— .18	+ 48	+ 2.4	+ 4.0	+ 12.5	— 33		8095	7500
+ .21	— .19	+ 49	+ 2.4	+ 4.1	+ 12.8	— 33		8205	7600
+ .23	— .20	+ 51	+ 2.5	+ 4.2	+ 13.1	— 34		8315	7700
+ .25	— .21	+ 52	+ 2.5	+ 4.2	+ 13.4	— 34		8425	7800
+ .27	— .23	+ 54	+ 2.5	+ 4.3	+ 13.7	— 35		8535	7900
+ .30	— .25	+ 55	+ 2.5	+ 4.3	+ 14.0	— 36		8640	8000



## FIELD ARTILLERY

TABLE B.—*Change in velocity due to change in temperature of powder—*

Temperature of powder, F-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second-----	-51	-44	-37	-29	-22	-15	-8	0	+8	+16	+25

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards-----	1000	2000	3000	4000	5000	6000	7000
Cant of 10 mils, effect-----	0.2	0.4	0.8	1.3	1.9	2.6	3.5
Range, yards-----	7000	8000	8500	9000	9070	9000	
Cant of 10 mils, effect-----	3.5	4.8	5.8	7.7	8.9	10.4	

NOTE.—Right wheel above left causes left deflection effect.

The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.











## ABBREVIATED FIRING TABLES

## SECTION IV

## FIRING TABLES, 155-MM HOWITZER

Characteristics of 155-mm (Schneider) howitzer M1917, M1917A1, M1918, and M1918A1, firing HE shell Mk. I (narrow band):

## 155-MM HOWITZER

Diameter of the bore between lands	inches	6. 102
Diameter of the bore between grooves	do	6. 178
Total length of howitzer	do	91. 81
Length of rifled portion	do	68. 39
Travel of projectile	do	69. 88
Capacity of powder chamber	cubic inches	425
Number of grooves		48
Character of rifling	{uniform twist 1 in 25.5 calibers	
Maximum pressure for which howitzer is de- signed	pounds/square inch	30, 000

## 155-MM HOWITZER CARRIAGE

Total traverse (one half on each side)	mils	105
Least possible elevation	do	0
Greatest possible elevation	do	752. 6
Traverse for one turn of traversing handwheel	do	0. 41
Change in elevation for one turn of elevating handwheel	do	4. 0
Horizontal site setting	do	300



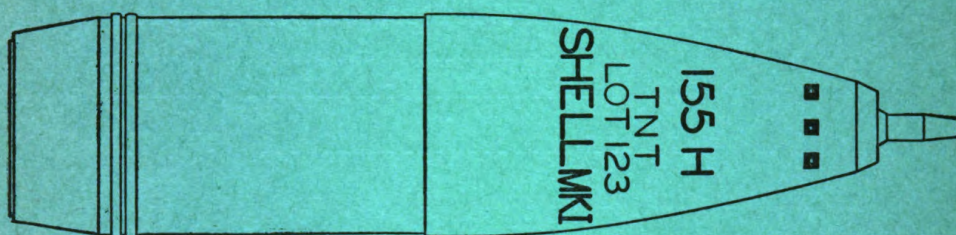
## FIELD ARTILLERY

## PROJECTILE—MEAN WEIGHT OF FUZED PROJECTILE IN POUNDS

*P. D. Fuzes M46 and M47*

Variations in weight are indicated by markings stenciled on the projectile as follows:

Marking	Weight
□ □	92.5
□ □ □	93.6
□ □ □ □ (Standard)	94.7
□ □ □ □ □	95.8
□ □ □ □ □ □	96.9



Characteristics of charges (HE shell Mk. I, narrow band; fuzes M46 and M47 <sup>1</sup>) for which tables are not included herein:

**CHARGE 1** Muzzle velocity: 680 f/s.

Powder charge: Charge consists of base section No. 1.  
The cartridge cloth is dyed green. The igniter pad is on the rear end of the base section.

Maximum range: 4,255 yards.

**CHARGE 2** Muzzle velocity: 742 f/s.

Powder charge: Charge consists of base section and one increment, numbered respectively 1 and 2.  
The cartridge cloth is dyed green. The igniter pad is on the rear end of the base section.

Maximum range: 4,910 yards.

\* \* \* \* \*

**CHARGE 7** Muzzle velocity: 1,478 f/s.

Powder charge: Charge consists of base section and two increments, numbered respectively 5, 6, and 7.  
(Some M2 charges in storage are in 7 sections.)  
The cartridge cloth is white. The igniter pad is on the rear end of the base section.

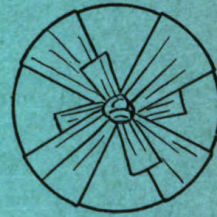
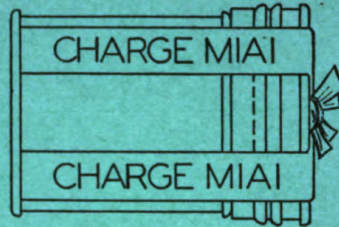
Maximum range: 12,295 yards.

<sup>1</sup> Fuzes Mk. III and Mk. IV, and shrapnel and chemical shell may also be used with this weapon. Tables and characteristics for these are not included herein.



## ABBREVIATED FIRING TABLES

**CHARGE 3** Muzzle velocity: 832 f/s.  
Powder charge: Charge consists of base section and two increments, numbered respectively 1, 2, and 3. The cartridge cloth is dyed green. The igniter pad is on the rear end of the base section.  
Maximum range: 5,990 yards.  
(Data for ranges 0—5,990 included herein.)





## FIELD ARTILLERY

TABLE A

1	2	3	4	5	6	7 8		9	10
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>		
yd.	m	m	m	yd.	sec.	yd.	yd.	1/-	No.
0	-5.8	2	7.0	14	0.0	8	0		1
100	+1.2	2	7.2	14	0.4	8	0	140	1
200	8.4	2	7.2	14	0.7	8	0	70	1
300	15.6	2	7.2	14	1.1	8	0	46	1
400	23.0	2	7.2	14	1.4	8	0	35	1
500	30.2	2	7.2	14	1.8	8	0	28	1
600	37.6	2	7.4	14	2.2	9	0	23	1
700	44.8	2	7.4	13	2.6	9	0	19.7	1
800	52.2	3	7.4	13	2.9	9	0	17.2	1
900	59.8	3	7.4	13	3.3	9	0	15.2	1
1000	67.2	3	7.4	13	3.7	9	0	13.6	1
1100	74.8	3	7.4	13	4.1	10	0	12.3	1
1200	82.2	3	7.6	13	4.5	10	0	11.2	1
1300	89.8	3	7.6	13	4.8	10	0	10.3	1
1400	97.6	3	7.6	13	5.2	10	1	9.5	1
1500	105.4	3	7.8	13	5.6	10	1	8.9	1
1600	113.2	4	7.8	13	6.0	11	1	8.3	1
1700	121.0	4	7.8	13	6.4	11	1	7.7	1
1800	128.8	4	8.0	12	6.7	11	1	7.2	1
1900	136.8	4	8.0	12	7.1	12	1	6.8	1
2000	145.0	4	8.2	12	7.5	12	1	6.4	1
2100	153.0	5	8.2	12	7.9	12	1	6.1	1
2200	161.2	5	8.4	12	8.3	13	1	5.8	1
2300	169.6	5	8.4	12	8.7	13	1	5.5	1
2400	178.0	5	8.6	12	9.1	13	1	5.2	1
2500	186.6	5	8.6	12	9.5	14	1	5.0	1
2600	195.2	6	8.8	11	9.9	14	1	4.7	1
2700	204.0	6	8.8	11	10.3	15	1	4.5	1
2800	212.8	6	9.0	11	10.8	15	1	4.3	1
2900	221.8	6	9.0	11	11.2	16	1	4.1	1
3000	230.8	6	9.2	11	11.6	16	1	4.0	1
3100	240.0	7	9.2	11	12.1	17	1	3.8	1
3200	249.4	7	9.4	10	12.5	17	1	3.7	2
3300	259.0	7	9.6	10	13.0	17	1	3.5	2
3400	268.8	7	9.8	10	13.4	18	1	3.4	2
3500	278.6	7	10.0	10	13.9	18	1	3.2	2
3600	288.6	8	10.2	10	14.4	19	2	3.1	2
3700	299.0	8	10.4	10	14.9	19	2	2.9	2
3800	309.6	8	10.6	9	15.4	19	2	2.8	2
3900	320.4	9	10.8	9	15.9	20	2	2.7	2
4000	331.4	9	11.2	9	16.4	20	2	2.6	2



## ABBREVIATED FIRING TABLES

TABLE A—Continued

11	12	13	14	15	16	17	18	19	1
Deflection effect		Complementary angle of site for each		Range effect of increase of—					Range R
Drift Dft.*	Lateral wind of 1 mile per hour (+) W-D	+1 mil of site	-1 mil of site	One square in weight of projectile. Four squares is standard. Wt.	One foot per second in MV VE	Air temperature 1°. Standard is 59° F. Temp.	Rear wind 1 mile per hour W-R	One percent in air density Den.	
m	m	m	m	yd.	yd.	yd.	yd.	yd.	yd.
L 4	0.0	.00	.00	0	0.0	0.0	0.0	0	0
L 4	0.0	.00	.00	-1	+0.2	0.0	0.0	0	100
L 4	0.0	.00	.00	-2	+0.4	0.0	0.0	0	200
L 4	0.0	.00	.00	-3	+0.7	0.0	0.0	0	300
L 4	0.0	.00	.00	-4	+0.9	0.0	0.0	0	400
L 3	0.0	.00	.00	-5	+1.1	0.0	+0.1	0	500
L 3	0.0	.00	.00	-6	+1.3	0.0	+0.1	0	600
L 3	0.0	.00	.00	-7	+1.6	0.0	+0.1	0	700
L 3	0.0	.00	.00	-8	+1.8	0.0	+0.1	0	800
L 3	0.0	.00	.00	-9	+2.1	0.0	+0.2	0	900
L 2	0.0	+.01	-.01	-10	+2.3	0.0	+0.2	0	1000
L 2	0.0	+.01	-.01	-11	+2.5	0.0	+0.2	0	1100
L 2	0.0	+.01	-.01	-12	+2.7	0.0	+0.2	0	1200
L 2	0.0	+.02	-.01	-12	+3.0	0.0	+0.3	0	1300
L 2	0.0	+.02	-.01	-13	+3.2	0.0	+0.3	0	1400
L 1	0.1	+.02	-.01	-14	+3.4	0.0	+0.3	0	1500
L 1	0.1	+.02	-.01	-15	+3.6	0.0	+0.3	-1	1600
L 1	0.1	+.02	-.01	-16	+3.8	0.0	+0.4	-1	1700
L 1	0.1	+.03	-.02	-17	+4.1	0.0	+0.4	-1	1800
0	0.1	+.03	-.02	-18	+4.3	0.0	+0.4	-1	1900
0	0.1	+.03	-.02	19	+4.5	0.0	+0.4	-1	2000
0	0.1	+.04	-.02	-20	+4.7	0.0	+0.5	-1	2100
0	0.1	+.04	-.03	-21	+4.9	0.0	+0.5	-1	2200
R 1	0.1	+.04	-.03	-21	+5.2	0.0	+0.5	-1	2300
R 1	0.1	+.05	-.03	-22	+5.4	0.0	+0.6	-1	2400
R 1	0.1	+.05	-.04	-23	+5.6	0.0	+0.6	-1	2500
R 1	0.1	+.06	-.04	-24	+5.8	0.0	+0.6	-2	2600
R 2	0.1	+.06	-.05	-25	+6.0	0.0	+0.7	-2	2700
R 2	0.1	+.07	-.06	-25	+6.2	0.0	+0.7	-2	2800
R 2	0.1	+.07	-.06	-26	+6.4	0.0	+0.8	-2	2900
R 2	0.1	+.08	-.07	-27	+6.6	0.0	+0.8	-2	3000
R 2	0.1	+.08	-.08	-28	+6.8	0.0	+0.8	-2	3100
R 3	0.1	+.09	-.08	-28	+7.0	0.0	+0.9	-2	3200
R 3	0.1	+.09	-.09	-29	+7.2	0.0	+0.9	-2	3300
R 3	0.1	+.10	-.10	-29	+7.4	0.0	+1.0	-3	3400
R 3	0.1	+.11	-.11	-30	+7.6	0.0	+1.0	-3	3500
R 4	0.1	+.12	-.12	-31	+7.8	0.0	+1.1	-3	3600
R 4	0.1	+.13	-.13	-31	+8.0	0.0	+1.1	-3	3700
R 4	0.1	+.14	-.14	-32	+8.2	0.0	+1.2	-3	3800
R 5	0.1	+.15	-.15	-32	+8.4	0.0	+1.2	-4	3900
R 5	0.1	+.16	-.16	-33	+8.6	-0.1	+1.3	-4	4000

\*Drift includes side jump.



## FIELD ARTILLERY

TABLE A—Continued

[illegible]







## FIELD ARTILLERY

TABLE B.—*Change in velocity due to change in temperature of powder—*

Temperature of powder, F.-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second-----	-19	-17	-14	-12	-9	-6	-3	0	+3	+6	+9

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards-----	1000	2000	3000	4000	4500	5000
Cant of 10 mils, effect-----	0.7	1.5	2.4	3.4	4.1	4.9

Range, yards-----	5000	5500	5600	5700	5800	5900	5990
Cant of 10 mils, effect-----	4.9	6.1	6.5	6.9	7.3	8.0	9.7

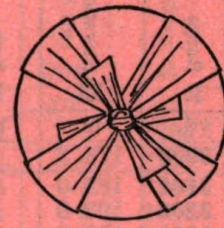
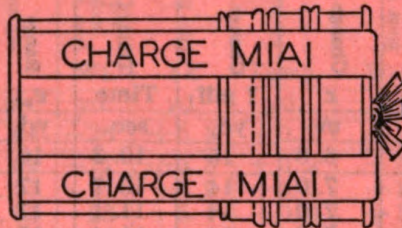
NOTE.—Right wheel above left causes left deflection effect.

The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.



**Powder charge:** Charge consists of base section and three increments, numbered respectively 1, 2, 3, and 4. The cartridge cloth is dyed green. The igniter pad is on the rear end of the base section.

**Maximum range:** 7,360 yards.





## FIELD ARTILLERY

TABLE A

1	2	3	4	5	6	7 8		9	10
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>		
yd.	m	m	m	yd.	sec.	yd.	yd.	1/-	No.
3000	178.2	4	6.8	15	10.3	16	2	5.1	1
3100	185.0	5	7.0	14	10.7	17	2	4.9	1
3200	192.0	5	7.0	14	11.1	17	2	4.7	1
3300	199.0	5	7.0	14	11.4	17	2	4.6	1
3400	206.2	5	7.2	14	11.8	18	2	4.4	1
3500	213.4	5	7.2	14	12.2	18	2	4.2	1
3600	220.6	6	7.4	14	12.6	19	2	4.1	2
3700	228.0	6	7.4	13	13.0	19	2	3.9	2
3800	235.4	6	7.6	13	13.4	19	2	3.8	2
3900	243.0	6	7.6	13	13.8	20	2	3.7	2
4000	250.8	6	7.8	13	14.2	20	2	3.5	2
4100	258.6	7	7.8	13	14.6	21	2	3.4	2
4200	266.4	7	8.0	13	15.0	21	2	3.3	2
4300	274.4	7	8.0	12	15.4	21	2	3.2	2
4400	282.6	7	8.2	12	15.8	22	2	3.1	2
4500	291.0	7	8.4	12	16.3	22	2	3.0	2
4600	299.4	8	8.4	12	16.7	23	2	2.9	2
4700	308.0	8	8.6	12	17.2	23	2	2.8	2
4800	316.6	8	8.8	11	17.6	23	2	2.7	2
4900	325.4	9	9.0	11	18.1	24	2	2.7	2
5000	334.4	9	9.2	11	18.5	24	2	2.6	2
5100	343.6	10	9.2	11	19.0	25	3	2.5	2
5200	352.8	10	9.4	11	19.5	25	3	2.4	3
5300	362.4	10	9.6	10	19.9	25	3	2.3	3
5400	372.2	11	10.0	10	20.4	26	3	2.3	3
5500	382.2	11	10.2	10	20.9	26	3	2.2	3
5600	392.4	12	10.4	10	21.4	27	3	2.1	3
5700	403.0	12	10.6	9	21.9	27	3	2.1	3
5800	413.8	12	11.0	9	22.4	27	3	2.00	3
5900	425.0	13	11.4	9	22.9	28	3	1.94	3
6000	436.6	13	11.8	9	23.5	28	3	1.88	3
6100	448.6	14	12.2	8	24.1	29	3	1.82	3
6200	461.0	14	12.6	8	24.7	29	3	1.76	3
6300	473.8	15	13.2	8	25.3	29	3	1.70	3
6400	487.2	16	13.8	7	25.9	30	3	1.64	3
6500	501.4	17	14.6	7	26.6	30	3	1.58	3
6600	516.4	18	15.6	6	27.3	31	3	1.52	4
6700	532.4	20	16.8	6	28.1	31	3	1.46	4
6800	549.6	22	18.2	6	28.9	31	4	1.40	4
6900	568.6	25	20.0	5	29.7	32	4	1.34	4
7000	590.0	29	22.4	5	30.6	32	4	1.28	4



## ABBREVIATED FIRING TABLES

TABLE A—Continued

11	12	13	14	15	16	17	18	19	1
Deflection effect		Complementary angle of site for each		Range effect of increase of—					
Drift	Lateral wind of 1 mile per hour (+)	+1 mil of site	-1 mil of site	One square in weight of projectile. Four squares is standard	One foot per second in MV	Air temperature 1°. Standard is 59° F.	Rear wind 1 mile per hour	One percent in air density	Range
Dft.*	W-D	m	m	Wt. yd.	VE yd.	Temp. yd.	W-R yd.	Den. yd.	R yd.
R 1	0.1	+ .04	- .04	-26	+5.6	+0.2	+1.2	-2	3000
R 1	0.1	+ .04	- .04	-27	+5.8	+0.2	+1.3	-2	3100
R 1	0.1	+ .05	- .05	-27	+5.9	+0.2	+1.3	-2	3200
R 2	0.1	+ .05	- .05	-28	+6.1	+0.2	+1.4	-2	3300
R 2	0.1	+ .06	- .06	-28	+6.2	+0.2	+1.4	-2	3400
R 2	0.1	+ .06	- .06	-29	+6.4	+0.2	+1.5	-3	3500
R 2	0.1	+ .06	- .06	-30	+6.6	+0.2	+1.6	-3	3600
R 3	0.1	+ .07	- .07	-30	+6.7	+0.2	+1.6	-3	3700
R 3	0.1	+ .07	- .07	-31	+6.9	+0.2	+1.7	-3	3800
R 3	0.1	+ .08	- .08	-31	+7.0	+0.2	+1.7	-3	3900
R 3	0.1	+ .08	- .08	-32	+7.2	+0.3	+1.8	-3	4000
R 3	0.1	+ .09	- .09	-33	+7.4	+0.3	+1.9	-4	4100
R 4	0.1	+ .09	- .09	-33	+7.5	+0.3	+2.0	-4	4200
R 4	0.1	+ .10	- .10	-34	+7.7	+0.3	+2.0	-4	4300
R 4	0.1	+ .10	- .10	-34	+7.8	+0.3	+2.1	-4	4400
R 4	0.1	+ .11	- .11	-35	+8.0	+0.3	+2.2	-4	4500
R 5	0.1	+ .12	- .12	-35	+8.2	+0.3	+2.3	-5	4600
R 5	0.1	+ .13	- .13	-36	+8.3	+0.3	+2.3	-5	4700
R 5	0.1	+ .14	- .13	-36	+8.5	+0.3	+2.4	-5	4800
R 6	0.1	+ .15	- .14	-37	+8.6	+0.3	+2.4	-5	4900
R 6	0.2	+ .16	- .15	-37	+8.8	+0.3	+2.5	-5	5000
R 6	0.2	+ .17	- .16	-38	+9.0	+0.3	+2.6	-6	5100
R 7	0.2	+ .18	- .17	-38	+9.2	+0.4	+2.6	-6	5200
R 7	0.2	+ .19	- .18	-39	+9.3	+0.4	+2.7	-6	5300
R 7	0.2	+ .20	- .19	-39	+9.5	+0.4	+2.7	-6	5400
R 7	0.2	+ .22	- .20	-40	+9.7	+0.4	+2.8	-7	5500
R 7	0.2	+ .24	- .21	-41	+9.9	+0.4	+2.9	-7	5600
R 8	0.2	+ .26	- .22	-41	+10.1	+0.4	+2.9	-7	5700
R 8	0.2	+ .28	- .24	-42	+10.2	+0.4	+3.0	-7	5800
R 9	0.2	+ .30	- .26	-42	+10.4	+0.4	+3.0	-8	5900
R 9	0.2	+ .32	- .28	-43	+10.6	+0.4	+3.1	-8	6000
R 9	0.2	+ .35	- .30	-44	+10.8	+0.4	+3.2	-8	6100
R 10	0.2	+ .38	- .33	-44	+11.0	+0.4	+3.2	-9	6200
R 10	0.2	+ .42	- .36	-45	+11.1	+1.4	+3.3	-9	6300
R 11	0.2	+ .46	- .40	-45	+11.3	+0.4	+3.3	-9	6400
R 11	0.2	+ .51	- .44	-46	+11.5	+0.4	+3.4	-10	6500
R 12	0.2	+ .58	- .49	-46	+11.7	+0.4	+3.5	-10	6600
R 13	0.2	+ .66	- .56	-47	+11.9	+0.4	+3.5	-10	6700
R 13	0.3	+ .77	- .65	-47	+12.1	+0.3	+3.6	-11	6800
R 14	0.3	+ .92	- .75	-48	+12.3	+0.3	+3.6	-11	6900
R 15	0.3	+1.19	- .87	-48	+12.5	+0.3	+3.7	-12	7000

\*Drift includes side jump.



TABLE B.—*Change in velocity due to change in temperature of powder*

Temperature of powder, F-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second-----	-18	-16	-14	-12	-9	-6	-3	0	+3	+6	+9

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards-----	1000	2000	3000	4000	5000	6000	6500
Cant of 10 mils, effect-----	0.6	1.2	1.8	2.6	3.5	4.6	5.4

Range, yards-----	6500	7000	7100	7200	7300	7360
Cant of 10 mils, effect-----	5.4	6.6	7.0	7.4	8.1	9.3

NOTE.—Right wheel above left causes left deflection effect.

The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.



## ABBREVIATED FIRING TABLES

**CHARGE 5** Muzzle velocity: 1083 f/s.

Powder charges: Charge M1A1 consists of base section and four increments, numbered respectively 1, 2, 3, 4, and 5. The cartridge cloth is dyed green. The igniter pad is on the rear end of the base section.

Charge M2 consists of base section No. 5. (Some M2 charges in storage are in 7 sections.) The cartridge cloth is white. The igniter pad is on the rear end of the base section.

For firing charge 5, either charge M1A1 or charge M2, prepared as shown in the figure, may be used; but preferably the former.

Maximum range: 9,295 yards.

(Data for ranges 5000-9000 included herein.)

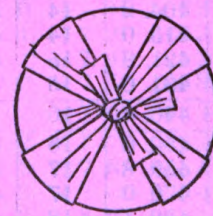
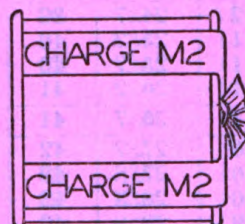
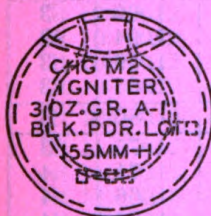
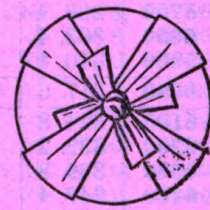
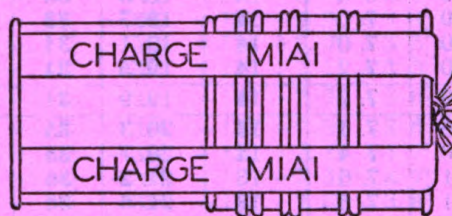
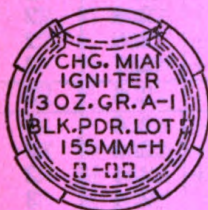




TABLE A

1	2	3	4	5	6	7	8	9	10
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line
						Range e <sup>pr</sup>	Deflection e <sup>pd</sup>		
yd.	m	m	m	yd.	sec.	yd.	yd.	1/-	No.
5000	250.2	8	6.4	16	16.0	30	3	3.4	2
5100	256.6	8	6.4	16	16.4	31	3	3.3	2
5200	263.0	8	6.6	15	16.7	31	3	3.3	2
5300	269.6	8	6.6	15	17.1	31	3	3.2	2
5400	276.2	8	6.8	15	17.5	32	3	3.1	2
5500	282.8	9	6.8	15	17.9	32	3	3.0	2
5600	289.6	9	6.8	15	18.3	33	3	2.9	2
5700	296.4	9	7.0	14	18.7	33	3	2.8	2
5800	303.4	10	7.0	14	19.1	34	3	2.8	2
5900	310.4	10	7.2	14	19.5	34	3	2.7	3
6000	317.6	10	7.2	14	19.9	34	3	2.6	3
6100	324.8	10	7.4	14	20.3	35	3	2.6	3
6200	332.2	10	7.4	14	20.7	35	3	2.5	3
6300	339.8	11	7.6	13	21.2	36	3	2.4	3
6400	347.4	11	7.6	13	21.6	36	3	2.4	3
6500	355.0	11	7.8	13	22.0	37	3	2.3	3
6600	362.8	12	7.8	13	22.5	37	3	2.3	3
6700	370.8	12	8.0	12	22.9	37	3	2.2	3
6800	379.0	12	8.2	12	23.4	38	4	2.1	3
6900	387.2	13	8.2	12	23.8	38	4	2.1	3
7000	395.6	13	8.4	12	24.3	39	4	2.0	3
7100	404.2	14	8.6	12	24.7	39	4	1.99	3
7200	413.0	14	8.8	11	25.2	40	4	1.94	3
7300	421.8	15	9.0	11	25.7	40	4	1.89	3
7400	431.0	15	9.2	11	26.2	41	4	1.85	3
7500	440.4	16	9.4	11	26.7	41	4	1.80	3
7600	450.0	16	9.6	10	27.2	42	4	1.75	3
7700	459.8	17	9.8	10	27.8	42	4	1.71	4
7800	470.0	17	10.2	10	28.3	42	4	1.66	4
7900	480.4	18	10.6	9	28.9	43	4	1.62	4
8000	491.2	19	11.0	9	29.4	43	4	1.57	4
8100	502.4	20	11.4	9	30.0	44	4	1.53	4
8200	514.0	21	11.8	8	30.6	44	4	1.49	4
8300	526.0	22	12.4	8	31.3	45	4	1.44	4
8400	538.6	23	13.0	8	31.9	45	5	1.40	4
8500	552.0	25	13.8	7	32.6	46	5	1.36	4
8600	566.2	27	14.6	7	33.3	46	5	1.32	4
8700	581.2	29	15.6	6	34.1	46	5	1.27	5
8800	597.6	32	17.0	6	34.9	47	5	1.23	5
8900	615.4	36	18.8	5	35.7	47	5	1.18	5
9000	635.6	41	21.6	5	36.7	48	5	1.13	5



## ABBREVIATED FIRING TABLES

TABLE A—Continued

11	12	13	14	15	16	17	18	19	20	1
Deflection effect		Complementary angle of site for each		Range effect of increase of—						
Drift	Lateral wind of 1 mile per hour (+)	+1 mil of site	-1 mil of site	One square in weight of projectile. Four squares is standard	One square in weight of projectile. Four squares is standard	One foot per second in MV	Air temperature 1°. Standard is 59° F.	Rear wind 1 mile per hour	One percent in air density	Range
Dft. <sup>1</sup>	W-D			Wt. <sup>2</sup>	Wt. <sup>3</sup>	VE	Temp.	W-R	Den.	R
m	m	m	m	yd.	yd.	yd.	yd.	yd.	yd.	yd.
R 5	0.2	+ .08	- .08	-28	-12	+6.2	+3.0	+4.4	-6	5000
R 5	0.2	+ .08	- .08	-29	-12	+6.3	+3.1	+4.5	-6	5100
R 6	0.2	+ .09	- .09	-29	-12	+6.4	+3.1	+4.6	-7	5200
R 6	0.2	+ .09	- .09	-29	-12	+6.5	+3.2	+4.8	-7	5300
R 6	0.2	+ .10	- .10	-30	-12	+6.6	+3.2	+4.9	-7	5400
R 6	0.2	+ .10	- .10	-30	-12	+6.7	+3.3	+5.0	-7	5500
R 6	0.2	+ .10	- .10	-30	-12	+6.8	+3.4	+5.1	-8	5600
R 7	0.2	+ .11	- .11	-30	-12	+6.9	+3.4	+5.3	-8	5700
R 7	0.2	+ .11	- .11	-31	-12	+7.0	+3.5	+5.4	-8	5800
R 7	0.2	+ .12	- .12	-31	-12	+7.1	+3.5	+5.6	-9	5900
R 7	0.2	+ .12	- .12	-31	-13	+7.2	+3.6	+5.7	-9	6000
R 7	0.2	+ .13	- .13	-31	-13	+7.3	+3.6	+5.8	-9	6100
R 7	0.2	+ .13	- .13	-32	-13	+7.4	+3.7	+6.0	-10	6200
R 8	0.2	+ .14	- .14	-32	-13	+7.5	+3.7	+6.1	-10	6300
R 8	0.2	+ .14	- .14	-32	-13	+7.6	+3.8	+6.3	-10	6400
R 8	0.2	+ .15	- .15	-32	-13	+7.7	+3.8	+6.4	-10	6500
R 8	0.2	+ .16	- .16	-33	-13	+7.8	+3.8	+6.5	-11	6600
R 9	0.2	+ .16	- .16	-33	-13	+7.9	+3.9	+6.6	-11	6700
R 9	0.2	+ .17	- .17	-33	-13	+8.0	+3.9	+6.8	-11	6800
R 9	0.2	+ .18	- .18	-33	-13	+8.1	+4.0	+6.9	-11	6900
R 9	0.2	+ .19	- .19	-33	-13	+8.2	+4.0	+7.0	-12	7000
R 10	0.2	+ .20	- .20	-34	-13	+8.3	+4.0	+7.1	-12	7100
R 10	0.2	+ .21	- .21	-34	-13	+8.5	+4.1	+7.2	-12	7200
R 10	0.2	+ .22	- .22	-34	-13	+8.6	+4.1	+7.4	-12	7300
R 10	0.2	+ .24	- .24	-34	-13	+8.7	+4.2	+7.5	-13	7400
R 10	0.2	+ .26	- .25	-34	-12	+8.8	+4.2	+7.6	-13	7500
R 11	0.2	+ .28	- .27	-35	-12	+8.9	+4.2	+7.7	-13	7600
R 11	0.2	+ .30	- .28	-35	-12	+9.0	+4.2	+7.8	-14	7700
R 11	0.3	+ .32	- .30	-35	-12	+9.1	+4.3	+7.9	-14	7800
R 12	0.3	+ .34	- .32	-36	-12	+9.2	+4.3	+8.0	-14	7900
R 12	0.3	+ .37	- .34	-36	-12	+9.4	+4.3	+8.1	-15	8000
R 12	0.3	+ .41	- .36	-36	-12	+9.5	+4.3	+8.2	-15	8100
R 13	0.3	+ .45	- .39	-37	-12	+9.6	+4.3	+8.3	-15	8200
R 13	0.3	+ .49	- .42	-37	-12	+9.8	+4.4	+8.3	-16	8300
R 14	0.3	+ .53	- .46	-37	-12	+9.9	+4.4	+8.4	-16	8400
R 14	0.3	+ .58	- .51	-37	-12	+10.0	+4.4	+8.5	-17	8500
R 15	0.3	+ .63	- .57	-38	-12	+10.2	+4.4	+8.6	-17	8600
R 15	0.3	+ .69	- .64	-38	-12	+10.3	+4.4	+8.7	-18	8700
R 16	0.3	+ .78	- .72	-38	-12	+10.5	+4.4	+8.7	-18	8800
R 16	0.3	+ .96	- .81	-39	-12	+10.7	+4.4	+8.8	-19	8900
R 17	0.3	+ 1.39	- .94	-39	-12	+10.8	+4.4	+8.8	-19	9000

<sup>1</sup> Drift includes side jump.<sup>2</sup> These values are to be used with propelling charge M1A1 (green bag).<sup>3</sup> These values are to be used with propelling charge M2 (white bag).



TABLE B.—*Change in velocity due to change in temperature of powder*

Temperature of powder, F-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second. Propelling charge M1A1 (green bag)-----	-17	-15	-13	-10	-8	-5	-3	0	+2	+5	+8
Change in velocity, feet per second. Propelling charge M2 (white bag)-----	-27	-23	-20	-16	-12	-8	-4	0	+4	+8	+12

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards	1000	2000	3000	4000	5000	6000	7000
Cant of 10 mils, effect-----	0.4	0.9	1.4	2.0	2.6	3.3	4.2

Range, yards	7000	8000	8500	9000	9100	9200	9295
Cant of 10 mils, effect-----	4.2	5.3	6.1	7.3	7.6	8.1	9.4

NOTE.—Right wheel above left causes left deflection effect.

The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.



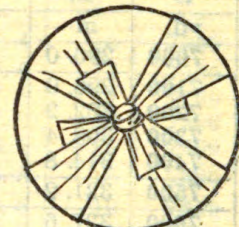
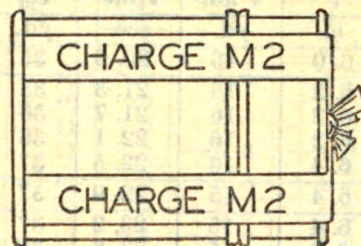
ABBREVIATED FIRING TABLES

CHARGE 6 Muzzle velocity: 1359 f/s.

Powder charge: Charge consists of base section and one increment, numbered 5 and 6 respectively. (Some M2 charges in storage are in 7 sections.) The cartridge cloth is white. The igniter pad is on the rear end of the base section.

Maximum range: 11,460 yards.

(Data for ranges 7000-11000 included herein.)



Range (Yards)	Time (Seconds)	Altitude (Feet)	Velocity (F/S)	Angle (Degrees)	Drift (Feet)	Windage (Feet)
7000	1.10	1000	1359	0.0	0.0	0.0
7200	1.12	1020	1359	0.0	0.0	0.0
7400	1.14	1040	1359	0.0	0.0	0.0
7600	1.16	1060	1359	0.0	0.0	0.0
7800	1.18	1080	1359	0.0	0.0	0.0
8000	1.20	1100	1359	0.0	0.0	0.0
8200	1.22	1120	1359	0.0	0.0	0.0
8400	1.24	1140	1359	0.0	0.0	0.0
8600	1.26	1160	1359	0.0	0.0	0.0
8800	1.28	1180	1359	0.0	0.0	0.0
9000	1.30	1200	1359	0.0	0.0	0.0
9200	1.32	1220	1359	0.0	0.0	0.0
9400	1.34	1240	1359	0.0	0.0	0.0
9600	1.36	1260	1359	0.0	0.0	0.0
9800	1.38	1280	1359	0.0	0.0	0.0
10000	1.40	1300	1359	0.0	0.0	0.0
10200	1.42	1320	1359	0.0	0.0	0.0
10400	1.44	1340	1359	0.0	0.0	0.0
10600	1.46	1360	1359	0.0	0.0	0.0
10800	1.48	1380	1359	0.0	0.0	0.0
11000	1.50	1400	1359	0.0	0.0	0.0



## FIELD ARTILLERY

TABLE A

1	2	3	4	5	6	7 8		9	10
Range R	Elevation El	Fork F	Change in elevation for 100-yard change in range c	Change in range for 1-mil change in elevation 1 mil	Time of flight Time	Probable error		Slope of fall Slope	Line number of metro message Line
						Range e <sub>pr</sub>	Deflection e <sub>pd</sub>		
yd.	m	m	m	yd.	sec.	yd.	yd.	1/-	No.
7000	290.0	9	6.0	16	20.9	35	5	2.7	3
7100	296.0	10	6.2	16	21.3	35	5	2.6	3
7200	302.2	10	6.2	16	21.7	36	5	2.5	3
7300	308.4	10	6.2	16	22.1	36	5	2.5	3
7400	314.8	10	6.4	16	22.5	37	5	2.4	3
7500	321.2	10	6.4	15	22.9	37	5	2.4	3
7600	327.6	11	6.4	15	23.2	37	5	2.3	3
7700	334.2	11	6.6	15	23.6	38	5	2.3	3
7800	340.8	11	6.6	15	24.0	38	5	2.2	3
7900	347.4	11	6.6	15	24.4	39	5	2.2	3
8000	354.2	11	6.8	15	24.9	39	5	2.1	3
8100	361.0	12	6.8	14	25.3	39	5	2.1	3
8200	368.0	12	7.0	14	25.7	40	5	2.0	3
8300	375.0	12	7.0	14	26.2	40	5	1.99	3
8400	382.0	12	7.0	14	26.6	41	5	1.95	3
8500	389.2	12	7.2	14	27.0	41	5	1.91	3
8600	396.4	13	7.2	14	27.5	41	5	1.87	4
8700	403.8	13	7.4	13	27.9	42	5	1.83	4
8800	411.4	13	7.6	13	28.4	42	5	1.79	4
8900	419.0	13	7.6	13	28.8	43	6	1.75	4
9000	426.6	14	7.8	13	29.3	43	6	1.72	4
9100	434.4	14	7.8	13	29.8	43	6	1.68	4
9200	442.4	15	8.0	12	30.3	44	6	1.64	4
9300	450.4	15	8.2	12	30.7	44	6	1.61	4
9400	458.6	16	8.2	12	31.2	45	6	1.58	4
9500	467.0	16	8.4	12	31.7	45	6	1.54	4
9600	475.6	17	8.6	11	32.2	45	6	1.51	4
9700	484.4	17	8.8	11	32.7	46	6	1.48	4
9800	493.4	18	9.0	11	33.3	46	6	1.44	5
9900	502.6	18	9.2	11	33.8	47	6	1.41	5
10000	512.0	19	9.6	10	34.3	47	6	1.38	5
10100	521.6	19	10.0	10	34.9	47	7	1.35	5
10200	531.6	20	10.4	10	35.5	48	7	1.32	5
10300	542.2	21	10.8	9	36.1	48	7	1.29	5
10400	553.4	22	11.4	9	36.7	49	7	1.26	5
10500	565.0	24	12.0	8	37.3	49	7	1.22	5
10600	577.2	25	12.8	8	38.0	49	7	1.19	5
10700	590.2	26	13.6	7	38.7	50	7	1.16	6
10800	604.2	28	14.6	7	39.5	50	7	1.12	6
10900	619.2	31	15.8	6	40.3	50	8	1.09	6
11000	635.6	35	17.4	6	41.2	50	8	1.05	6

## ABBREVIATED FIRING TABLES

TABLE A—Continued

11	12	13	14	15	16	17	18	19	1
Deflection effect		Complementary angle of site for each		Range effect of increase of—					Range R
Drift Dft.*	Lateral wind of 1 mile per hour (+) W-D	+1 mil of site	-1 mil of site	One square in weight of projectile. Four square is standard. Wt.	One foot per second in MV VE	Air temperature 1°. Standard is 59° F. Temp.	Rear wind 1 mile per hour W-R	One percent in air density Den.	
m	m	m	m	yd.	yd.	yd.	yd.	yd.	
R 6	0.3	+1.10	-1.10	-6	+5.6	+3.6	+7.4	-16	7000
R 6	0.3	+1.10	-1.10	-6	+5.6	+3.7	+7.6	-17	7100
R 7	0.3	+1.10	-1.10	-6	+5.7	+3.8	+7.8	-17	7200
R 7	0.3	+1.11	-1.11	-5	+5.7	+3.9	+7.9	-18	7300
R 7	0.3	+1.11	-1.11	-5	+5.8	+4.0	+8.1	-18	7400
R 7	0.4	+1.11	-1.11	-5	+5.8	+4.1	+8.3	-18	7500
R 7	0.4	+1.12	-1.12	-5	+5.8	+4.2	+8.5	-19	7600
R 8	0.4	+1.12	-1.12	-4	+5.9	+4.3	+8.6	-19	7700
R 8	0.4	+1.13	-1.13	-4	+5.9	+4.3	+8.8	-19	7800
R 8	0.4	+1.13	-1.13	-4	+6.0	+4.4	+9.0	-20	7900
R 8	0.4	+1.13	-1.13	-3	+6.0	+4.5	+9.2	-20	8000
R 8	0.4	+1.13	-1.13	-3	+6.0	+4.6	+9.4	-21	8100
R 9	0.4	+1.14	-1.14	-3	+6.1	+4.7	+9.6	-21	8200
R 9	0.4	+1.14	-1.14	-3	+6.1	+4.7	+9.7	-21	8300
R 9	0.4	+1.15	-1.15	-2	+6.2	+4.8	+9.9	-22	8400
R 9	0.4	+1.15	-1.15	-2	+6.2	+4.9	+10.1	-22	8500
R 9	0.4	+1.16	-1.16	-2	+6.2	+5.0	+10.3	-23	8600
R 10	0.4	+1.16	-1.16	-1	+6.2	+5.0	+10.5	-23	8700
R 10	0.4	+1.17	-1.17	-1	+6.3	+5.1	+10.7	-24	8800
R 10	0.4	+1.17	-1.17	0	+6.3	+5.1	+10.9	-24	8900
R 10	0.4	+1.18	-1.18	0	+6.3	+5.2	+11.1	-24	9000
R 10	0.4	+1.19	-1.19	0	+6.3	+5.3	+11.3	-25	9100
R 11	0.4	+1.20	-1.20	0	+6.4	+5.3	+11.5	-25	9200
R 11	0.4	+1.21	-1.20	+1	+6.4	+5.4	+11.7	-26	9300
R 11	0.4	+1.22	-1.21	+1	+6.5	+5.4	+11.9	-26	9400
R 11	0.4	+1.23	-1.22	+1	+6.5	+5.5	+12.1	-27	9500
R 12	0.4	+1.25	-1.23	+1	+6.5	+5.6	+12.3	-27	9600
R 12	0.4	+1.27	-1.25	+2	+6.6	+5.6	+12.5	-28	9700
R 12	0.4	+1.29	-1.27	+2	+6.6	+5.7	+12.7	-28	9800
R 13	0.4	+1.31	-1.28	+3	+6.7	+5.7	+12.9	-29	9900
R 13	0.5	+1.33	-1.30	+3	+6.7	+5.8	+13.1	-29	10000
R 13	0.5	+1.36	-1.32	+3	+6.8	+5.9	+13.3	-30	10100
R 14	0.5	+1.40	-1.35	+4	+6.8	+5.9	+13.5	-30	10200
R 14	0.5	+1.44	-1.38	+4	+6.9	+6.0	+13.8	-31	10300
R 15	0.5	+1.49	-1.41	+5	+6.9	+6.0	+14.0	-31	10400
R 15	0.5	+1.56	-1.45	+5	+7.0	+6.1	+14.2	-32	10500
R 16	0.5	+1.64	-1.50	+5	+7.0	+6.2	+14.4	-32	10600
R 16	0.5	+1.73	-1.56	+6	+7.1	+6.2	+14.6	-33	10700
R 16	0.5	+1.84	-1.63	+6	+7.1	+6.3	+14.9	-33	10800
R 17	0.5	+1.00	-1.72	+7	+7.2	+6.3	+15.1	-34	10900
R 17	0.5	+1.24	-1.83	+7	+7.2	+6.4	+15.3	-35	11000

\*Drift includes side jump.



TABLE B.—*Change in velocity due to change in temperature of powder*

Temperature of powder, F-----	0	10	20	30	40	50	60	70	80	90	100
Change in velocity, feet per second-----	-37	-32	-27	-21	-16	-11	-5	0	+5	+11	+16

TABLE C.—*Cant of carriage axle, deflection effect in mils due to—*

Range, yards-----	1000	2000	3000	4000	5000	6000	7000	8000	9000
Cant of 10 mils, effect--	0.3	0.6	1.0	1.4	1.9	2.4	3.0	3.7	4.5

Range, yards-----	9000	10000	10500	11000	11100	11200	11300	11400	11460
Cant of 10 mils, effect--	4.5	5.6	6.3	7.3	7.6	7.9	8.3	8.9	10.0

NOTE.—Right wheel above left causes left deflection effect.

The deflection due to cant is automatically compensated for by cross-leveling the sight, and this table is to be used only in the event the sight cannot be so cross-leveled.

ABBREVIATED FIRING TABLES

APPENDIX I

CONDENSED TABLE OF MAXIMUM ORDINATES (feet)

Range, yards	75-mm gun		155-mm howitzer			
	Shrapnel, 21 section, normal charge	Shell Mk. I, fuzes M46 and M47, normal charge	Shell Mk. I, fuzes M46 and M47			
			Charge 3	Charge 4	Charge 5	Charge 6
1,000	16	16	54	42	46	20
2,000	75	79	229	178	153	95
3,000	213	229	551	423	339	236
4,000	451	501	1,079	806	624	450
5,000	814	930	1,970	1,375	1,032	782
6,000	1,347	1,569		2,231	1,597	1,218
7,000	2,129	2,507		3,769	2,378	1,795
8,000	3,257	3,943			3,498	2,545
9,000	5,055	7,010			5,430	3,518
10,000						4,822



## FIELD ARTILLERY

## APPENDIX II

## EQUIVALENT EROSION EFFECTS

75-MM GUN		
Projectile	Number of rounds equivalent in erosion effect to one round full charge	Equivalent erosion effects in decimals
Shrapnel	1	1
Shell Mk. I normal charge	2	. 5
Shell Mk. I reduced charge	30	. 033
155-MM HOWITZER		
Charge	Number of rounds equivalent in erosion effect to one full charge	Equivalent erosion effects in decimals
1	120	. 0083
2	70	. 014
3	40	. 025
4	20	. 050
5	10	. 10
6	3	. 3
7	1	1. 0

[A. G. 062.11 (8-18-41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

E. S. ADAMS,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

B2, 7, 17(3); Bn and H6(5); C6(8).  
(For explanation of symbols see FM 21-6.)

